PRELIMINARY DRAINAGE REPORT FOR:

ESTATES AT McDONALD

RAMONA, CA

TM 5560 RPL1

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REV. DATE: 4-9-09

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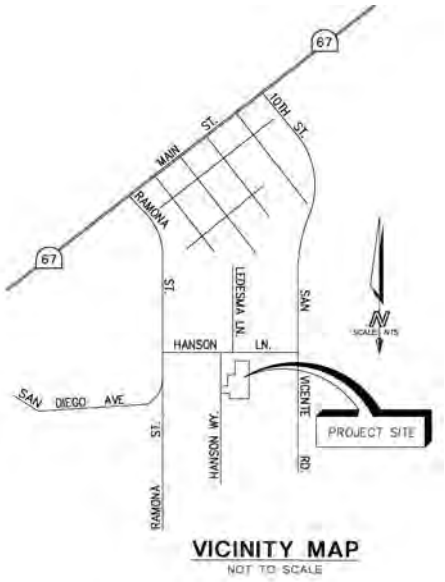
PROJECT DISCUSSION

PURPOSE FOR PROJECT:

The proposed development consists of the construction of 15 single-family homes on approximately 9.8 acres of largely vacant land. There is an approved TM, grading and improvement plans for this property with a lower density development that was approved by the County of San Diego. The proposed street and utilities including a storm drain system were also approved as part of the previous TM. The purpose of this report is to determine the peak runoff volume of the site and compare to the pre-development conditions. The adequacy of the proposed storm drain system will be analyzed as a result of the increase in density.

VICINITY MAP



VICINITY MAP
NOT TO SCALE

DESCRIPTION OF WATERSHED

The site is located on the southeasterly corner of the intersection of Hanson Lane and Hanson Way, between Ramona Street and San Vincente Road, in the community of Ramona, in the County of San Diego, State of California.

Under the existing conditions, the entire site sheet flows northerly and into an existing 18" RCP culvert crossing the existing Hanson Lane.

Under the proposed conditions, the northerly portion of the site drains on the proposed super-elevated street. The entire site drains onto the street and into a series of grass-lined swales and driveway culverts along the easterly site of the street. The flow eventually enters a major bio-filtration grass swale located at the southeasterly corner of the intersection of Hanson Lane and proposed street. The flow from the swale enters a 1.5'X2.5' box culvert that replaces the

existing 18” RCP culvert crossing Hanson Lane. The upstream water shed from the area southwesterly of the project, including the existing development along School Daze drain onto the existing Hanson Lane and into a proposed curb inlet located on the westerly side of the intersection of Clae Jean Court that discharges into a 1’x5.5’ box. The runoff is then conveyed easterly within the 1’x5.5’ culvert and connects to the 1.5’x2.5’ culvert. After this junction point, the proposed culvert crossing Hanson Lane is enlarged to an 1.5’x6.5’ box to accommodate the combined runoff. The 1.5’x6.5’ box culvert conveys the discharge across Hanson Lane and into an existing 18” concrete ditch.

DECLARATON OF RESPONSIBLE CHARGE

I, HEREBY DECLARE THAT I AM THE ENGINEER OF WORK FOR THIS PROJECT, THAT I HAVE EXERCISED RESPONSIBLE CHARGE OVER THE DESIGN OF THE PROJECT AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.

I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE COUNTY OF SAN DIEGO IS CONDINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME, AS ENGINEER OF WORK, OF MY RESPONSIBILITIES FOR PROJECT DESIGN.

4-9-09

DAVID H. YEH, P.E. 62717 DATE

METHOD OF ANALYSIS

3.1 THE RATIONAL METHOD

The Rational Method (RM) is a mathematical formula used to determine the maximum runoff rate from a given rainfall. It has particular application in urban storm drainage, where it is used to estimate peak runoff rates from small urban and rural watersheds for the design of storm drains and small drainage structures. The RM is recommended for analyzing the runoff response from drainage areas up to approximately 1 square mile in size. It should not be used in instances where there is a junction of independent drainage systems or for drainage areas greater than approximately 1 square mile in size. In these instances, the Modified Rational Method (MRM) should be used for junctions of independent drainage systems in watersheds up to approximately 1 square mile in size (see Section 3.4); or the NRCS Hydrologic Method should be used for watersheds greater than approximately 1 square mile in size (see Section 4).

The RM can be applied using any design storm frequency (e.g., 100-year, 50-year, 10-year, etc.). The local agency determines the design storm frequency that must be used based on the type of project and specific local requirements. A discussion of design storm frequency is provided in Section 2.3 of this manual. A procedure has been developed that converts the 6-hour and 24-hour precipitation isopluvial map data to an Intensity-Duration curve that can be used for the rainfall intensity in the RM formula as shown in Figure 3-1. The RM is applicable to a 6-hour storm duration because the procedure uses Intensity-Duration Design Charts that are based on a 6-hour storm duration.

3.1.1 Rational Method Formula

The RM formula estimates the peak rate of runoff at any location in a watershed as a function of the drainage area (A), runoff coefficient (C), and rainfall intensity (I) for a duration equal to the time of concentration (T_c), which is the time required for water to

flow from the most remote point of the basin to the location being analyzed. The RM formula is expressed as follows:

$$Q = C\,I\,A$$

Where: Q = peak discharge, in cubic feet per second (cfs)

C = runoff coefficient, proportion of the rainfall that runs off the surface (no units)

I = average rainfall intensity for a duration equal to the T_c for the area, in inches per hour (Note: If the computed T_c is less than 5 minutes, use 5 minutes for computing the peak discharge, Q)

A = drainage area contributing to the design location, in acres

Combining the units for the expression CIA yields:

$$\left(\frac{1\,\text{acre}\times\text{inch}}{\text{hour}}\right)\left(\frac{43{,}560\,\text{ft}^2}{\text{acre}}\right)\left(\frac{1\,\text{foot}}{12\,\text{inches}}\right)\left(\frac{1\,\text{hour}}{3{,}600\,\text{seconds}}\right) \Rightarrow 1.008\,\text{cfs}$$

For practical purposes the unit conversion coefficient difference of 0.8% can be ignored.

The RM formula is based on the assumption that for constant rainfall intensity, the peak discharge rate at a point will occur when the raindrop that falls at the most upstream point in the tributary drainage basin arrives at the point of interest.

Unlike the MRM (discussed in Section 3.4) or the NRCS hydrologic method (discussed in Section 4), the RM does not create hydrographs and therefore does not add separate subarea hydrographs at collection points. Instead, the RM develops peak discharges in the main line by increasing the T_c as flow travels downstream.

Characteristics of, or assumptions inherent to, the RM are listed below:

- The discharge flow rate resulting from any I is maximum when the I lasts as long as or longer than the T_c.

- The storm frequency of peak discharges is the same as that of I for the given T_c.

- The fraction of rainfall that becomes runoff (or the runoff coefficient, C) is independent of I or precipitation zone number (PZN) condition (PZN Condition is discussed in Section 4.1.2.4).

- The peak rate of runoff is the only information produced by using the RM.

3.1.2 Runoff Coefficient

Table 3-1 lists the estimated runoff coefficients for urban areas. The concepts related to the runoff coefficient were evaluated in a report entitled *Evaluation, Rational Method "C" Values* (Hill, 2002) that was reviewed by the Hydrology Manual Committee. The Report is available at San Diego County Department of Public Works, Flood Control Section and on the San Diego County Department of Public Works web page.

The runoff coefficients are based on land use and soil type. Soil type can be determined from the soil type map provided in Appendix A. An appropriate runoff coefficient (C) for each type of land use in the subarea should be selected from this table and multiplied by the percentage of the total area (A) included in that class. The sum of the products for all land uses is the weighted runoff coefficient (Σ[CA]). Good engineering judgment should be used when applying the values presented in Table 3-1, as adjustments to these values may be appropriate based on site-specific characteristics. In any event, the impervious percentage (% Impervious) as given in the table, for any area, shall govern the selected value for C. The runoff coefficient can also be calculated for an area based on soil type and impervious percentage using the following formula:

$$C = 0.90 \times (\% \text{ Impervious}) + C_p \times (1 - \% \text{ Impervious})$$

Where: C_p = Pervious Coefficient Runoff Value for the soil type (shown in Table 3-1 as Undisturbed Natural Terrain/Permanent Open Space, 0% Impervious). Soil type can be determined from the soil type map provided in Appendix A.

The values in Table 3-1 are typical for most urban areas. However, if the basin contains rural or agricultural land use, parks, golf courses, or other types of nonurban land use that are expected to be permanent, the appropriate value should be selected based upon the soil and cover and approved by the local agency.

3.1.4 Time of Concentration

The Time of Concentration (T_c) is the time required for runoff to flow from the most remote part of the drainage area to the point of interest. The T_c is composed of two components: initial time of concentration (T_i) and travel time (T_t). Methods of computation for T_i and T_t are discussed below. The T_i is the time required for runoff to travel across the surface of the most remote subarea in the study, or "initial subarea." Guidelines for designating the initial subarea are provided within the discussion of computation of T_i. The T_t is the time required for the runoff to flow in a watercourse (e.g., swale, channel, gutter, pipe) or series of watercourses from the initial subarea to the point of interest. For the RM, the T_c at any point within the drainage area is given by:

$$T_c = T_i + T_t$$

Methods of calculation differ for natural watersheds (nonurbanized) and for urban drainage systems. When analyzing storm drain systems, the designer must consider the possibility that an existing natural watershed may become urbanized during the useful life of the storm drain system. Future land uses must be used for T_c and runoff calculations, and can be determined from the local Community General Plan.

3.1.4.1 Initial Time of Concentration

The initial time of concentration is typically based on sheet flow at the upstream end of a drainage basin. The Overland Time of Flow (Figure 3-3) is approximated by an equation developed by the Federal Aviation Agency (FAA) for analyzing flow on runaways (FAA, 1970). The usual runway configuration consists of a crown, like most freeways, with sloping pavement that directs flow to either side of the runway. This type of flow is uniform in the direction perpendicular to the velocity and is very shallow. Since these depths are ¼ of an inch (more or less) in magnitude, the relative roughness is high. Some higher relative roughness values for overland flow are presented in Table 3.5 of the *HEC-1 Flood Hydrograph Package User's Manual* (USACE, 1990).

SUMMARY

	PRE-DEVELOPMENT			POST-DEVELOPMENT		
STORM EVENT	Q (cfs)	AREA	V	Q (cfs)	AREA	V
	NODE 117	(AC)	(FPS)	NODE 212	(AC)	(FPS)
100-YEAR	68.2	30.2	38.6*	66.2	30.2	6.8**

Based on the hydrology and hydraulics calculations, the proposed development will not increase the overall peak runoff from the site under the 100-year storm events due to low density residential development and increased time of travel.

The proposed storm drain system is adequate to handle the anticipated peak runoff from the site.

The existing concrete ditch located on the northerly side of Hanson Lane is under capacity under both the pre and post-development conditions, however, since the overall peak discharge exiting the proposed side will decrease, it is reasonable to conclude the proposed development will not have any additional negative impact to the down stream storm drain systems.

* Velocity based on AES computer analysis assuming full discharge.
** velocity calculated based on peak flow of 66.2 cfs and cross section area of culvert opening of 9.75 sf – 66.2 / 9.75 = 6.8 fps.

WATERSHED/HYDROLOGY MAPS

HYDROLOGY CALCULATIONS

PRE-DEVLEOPMENT CONDITONS

100-YEAR STORM

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**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2004 Advanced Engineering Software (aes)
              Ver. 2.0 Release Date: 01/01/2004  License ID 1503

                              Analysis prepared by:

                                LANDMARK CONSULTING
                           9555 GENESEE AVENUE, SUITE 200
                                SAN DEIGO, CA 92121
                                 TEL:  858-587-8070

 ************************* DESCRIPTION OF STUDY *************************
* ESTATES AT MCDONALD, RAMONA, CA                                        *
* PRE-DEVELOPMENT CONDITIONS                                             *
* 100-YEAR STORM                                                         *
 ************************************************************************

  FILE NAME: 1061XC.DAT
  TIME/DATE OF STUDY: 11:00 04/08/2009
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   18.0     13.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  5.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  PERENNIAL GRASS GOOD COVER RUNOFF COEFFICIENT = .3500
```

```
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  80
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    20.00
  UPSTREAM ELEVATION(FEET) =   1558.00
  DOWNSTREAM ELEVATION(FEET) =   1550.00
  ELEVATION DIFFERENCE(FEET) =      8.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.803
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.16
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.16

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1550.00  DOWNSTREAM(FEET) =   1450.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   650.00   CHANNEL SLOPE =  0.1538
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.020   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.756
  PERENNIAL GRASS GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  80
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      4.31
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.14
  AVERAGE FLOW DEPTH(FEET) =   0.05   TRAVEL TIME(MIN.) =   2.62
  Tc(MIN.) =   5.42
  SUBAREA AREA(ACRES) =     2.75       SUBAREA RUNOFF(CFS) =    8.43
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      2.80         PEAK FLOW RATE(CFS) =       8.58

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.08   FLOW VELOCITY(FEET/SEC.) =   5.17
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    103.00 =   670.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1450.00  DOWNSTREAM(FEET) =   1425.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   660.00   CHANNEL SLOPE =  0.0379
  CHANNEL BASE(FEET) =   25.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.236
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  82
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     14.64
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.93
  AVERAGE FLOW DEPTH(FEET) =   0.19   TRAVEL TIME(MIN.) =   3.75
  Tc(MIN.) =   9.17
```

```
  SUBAREA AREA(ACRES) =     4.70       SUBAREA RUNOFF(CFS) =   12.02
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.388
  TOTAL AREA(ACRES) =      7.50         PEAK FLOW RATE(CFS) =      18.13

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.21   FLOW VELOCITY(FEET/SEC.) =   3.20
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    104.00 =  1330.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1425.00  DOWNSTREAM(FEET) =   1423.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   130.00   CHANNEL SLOPE =  0.0085
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.941
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     18.47
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.03
  AVERAGE FLOW DEPTH(FEET) =   0.76   TRAVEL TIME(MIN.) =   0.71
  Tc(MIN.) =   9.89
  SUBAREA AREA(ACRES) =     0.20       SUBAREA RUNOFF(CFS) =    0.68
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.392
  TOTAL AREA(ACRES) =      7.70         PEAK FLOW RATE(CFS) =      18.13

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.75   FLOW VELOCITY(FEET/SEC.) =   3.01
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    105.00 =  1460.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    107.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    25.00
  UPSTREAM ELEVATION(FEET) =   1427.50
  DOWNSTREAM ELEVATION(FEET) =   1427.00
  ELEVATION DIFFERENCE(FEET) =      0.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.786
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.26
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.26
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    105.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1427.00  DOWNSTREAM ELEVATION(FEET) = 1423.90
  STREET LENGTH(FEET) =   295.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.53
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    7.92
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.05
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.58
  STREET FLOW TRAVEL TIME(MIN.) =   2.39   Tc(MIN.) =   6.18
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.044
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.570
  SUBAREA AREA(ACRES) =    0.55      SUBAREA RUNOFF(CFS) =    2.52
  TOTAL AREA(ACRES) =      0.60        PEAK FLOW RATE(CFS) =       2.75

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =  10.31
  FLOW VELOCITY(FEET/SEC.) =  2.33   DEPTH*VELOCITY(FT*FT/SEC.) =   0.77
  LONGEST FLOWPATH FROM NODE    106.00 TO NODE    105.00 =   320.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    109.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  PERENNIAL GRASS GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  80
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    20.00
  UPSTREAM ELEVATION(FEET) =   1604.00
  DOWNSTREAM ELEVATION(FEET) =   1600.00
```

```
  ELEVATION DIFFERENCE(FEET) =      4.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.803
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.16
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.16

****************************************************************************
  FLOW PROCESS FROM NODE    109.00 TO NODE    109.10 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1600.00  DOWNSTREAM(FEET) =   1517.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   490.00   CHANNEL SLOPE =  0.1694
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.072
  PERENNIAL GRASS GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  80
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.20
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.44
  AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =   3.34
  Tc(MIN.) =   6.15
  SUBAREA AREA(ACRES) =     2.15       SUBAREA RUNOFF(CFS) =    6.07
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      2.20         PEAK FLOW RATE(CFS) =       6.22

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   3.16
  LONGEST FLOWPATH FROM NODE    108.00 TO NODE    109.10 =   510.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    109.10 TO NODE    110.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1517.00  DOWNSTREAM(FEET) =   1465.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   450.00   CHANNEL SLOPE =  0.1156
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.020   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.100
  PERENNIAL GRASS GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  80
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     12.96
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.54
  AVERAGE FLOW DEPTH(FEET) =   0.11   TRAVEL TIME(MIN.) =   1.35
  Tc(MIN.) =   7.50
  SUBAREA AREA(ACRES) =     5.40       SUBAREA RUNOFF(CFS) =   13.42
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      7.60         PEAK FLOW RATE(CFS) =      18.89

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
  DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   6.50
  LONGEST FLOWPATH FROM NODE    108.00 TO NODE    110.00 =   960.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    111.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1465.00  DOWNSTREAM(FEET) =   1436.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   480.00   CHANNEL SLOPE =  0.0604
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   8.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.208
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  82
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     25.24
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.61
  AVERAGE FLOW DEPTH(FEET) =   0.25   TRAVEL TIME(MIN.) =   1.73
  Tc(MIN.) =   9.23
  SUBAREA AREA(ACRES) =     5.00       SUBAREA RUNOFF(CFS) =   12.73
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.374
  TOTAL AREA(ACRES) =     12.60         PEAK FLOW RATE(CFS) =      29.24

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.27   FLOW VELOCITY(FEET/SEC.) =   4.85
  LONGEST FLOWPATH FROM NODE    108.00 TO NODE    111.00 =  1440.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    112.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1436.00  DOWNSTREAM ELEVATION(FEET) = 1424.50
  STREET LENGTH(FEET) =   530.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      34.96
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.50
    HALFSTREET FLOOD WIDTH(FEET) =   18.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.87
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.43
  STREET FLOW TRAVEL TIME(MIN.) =   1.81   Tc(MIN.) =  11.05
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.530
```

```
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.396
  SUBAREA AREA(ACRES) =    4.50      SUBAREA RUNOFF(CFS) =   11.45
  TOTAL AREA(ACRES) =     17.10        PEAK FLOW RATE(CFS) =      37.49

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.51   HALFSTREET FLOOD WIDTH(FEET) =  18.38
  FLOW VELOCITY(FEET/SEC.) =  5.01   DEPTH*VELOCITY(FT*FT/SEC.) =   2.54
  LONGEST FLOWPATH FROM NODE    108.00 TO NODE    112.00 =  1970.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  11.05
  RAINFALL INTENSITY(INCH/HR) =   5.53
  TOTAL STREAM AREA(ACRES) =    17.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     37.49

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    114.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  PERENNIAL GRASS GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  80
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    20.00
  UPSTREAM ELEVATION(FEET) =   1565.00
  DOWNSTREAM ELEVATION(FEET) =   1560.00
  ELEVATION DIFFERENCE(FEET) =      5.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.803
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.16
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.16

****************************************************************************
  FLOW PROCESS FROM NODE    114.00 TO NODE    115.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1660.00  DOWNSTREAM ELEVATION(FEET) = 1441.00
  STREET LENGTH(FEET) =   700.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020
```

```
  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.41
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.24
    HALFSTREET FLOOD WIDTH(FEET) =    5.74
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    9.87
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.38
  STREET FLOW TRAVEL TIME(MIN.) =   1.18   Tc(MIN.) =   3.98
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  82
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.409
  SUBAREA AREA(ACRES) =    2.25      SUBAREA RUNOFF(CFS) =    8.51
  TOTAL AREA(ACRES) =      2.30        PEAK FLOW RATE(CFS) =       8.67

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   8.07
  FLOW VELOCITY(FEET/SEC.) = 11.26   DEPTH*VELOCITY(FT*FT/SEC.) =   3.24
  LONGEST FLOWPATH FROM NODE    113.00 TO NODE    115.00 =   720.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    116.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1441.00  DOWNSTREAM ELEVATION(FEET) = 1426.00
  STREET LENGTH(FEET) =   700.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.30
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.45
    HALFSTREET FLOOD WIDTH(FEET) =   16.40
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.38
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.99
  STREET FLOW TRAVEL TIME(MIN.) =   2.66   Tc(MIN.) =   6.65
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.674
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  82
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.409
```

```
  SUBAREA AREA(ACRES) =    2.30      SUBAREA RUNOFF(CFS) =    7.24
  TOTAL AREA(ACRES) =      4.60        PEAK FLOW RATE(CFS) =      14.45

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.48   HALFSTREET FLOOD WIDTH(FEET) =  17.47
  FLOW VELOCITY(FEET/SEC.) =  4.56   DEPTH*VELOCITY(FT*FT/SEC.) =   2.17
  LONGEST FLOWPATH FROM NODE    113.00 TO NODE    116.00 =  1420.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    112.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1426.00  DOWNSTREAM ELEVATION(FEET) = 1424.50
  STREET LENGTH(FEET) =   270.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      14.73
    ***STREET FLOW SPLITS OVER STREET-CROWN***
    FULL DEPTH(FEET) =    0.49   FLOOD WIDTH(FEET) =   18.00
    FULL HALF-STREET VELOCITY(FEET/SEC.) =    2.36
    SPLIT DEPTH(FEET) =    0.46   SPLIT FLOOD WIDTH(FEET) =   16.91
    SPLIT FLOW(CFS) =    6.79   SPLIT VELOCITY(FEET/SEC.) =    2.28
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.49
    HALFSTREET FLOOD WIDTH(FEET) =   18.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.36
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.15
  STREET FLOW TRAVEL TIME(MIN.) =   1.90   Tc(MIN.) =   8.55
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.524
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.419
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.57
  TOTAL AREA(ACRES) =      4.70        PEAK FLOW RATE(CFS) =      14.45

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.49   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  2.36   DEPTH*VELOCITY(FT*FT/SEC.) =   1.15
  LONGEST FLOWPATH FROM NODE    113.00 TO NODE    112.00 =  1690.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
```

```
==========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   8.55
  RAINFALL INTENSITY(INCH/HR) =   6.52
  TOTAL STREAM AREA(ACRES) =     4.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     14.45

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       37.49    11.05        5.530         17.10
      2       14.45     8.55        6.524          4.70

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       43.47     8.55       6.524
      2       49.74    11.05       5.530

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     49.74   Tc(MIN.) =   11.05
  TOTAL AREA(ACRES) =     21.80
  LONGEST FLOWPATH FROM NODE    108.00 TO NODE    112.00 =  1970.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    105.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1424.50  DOWNSTREAM ELEVATION(FEET) = 1423.90
  STREET LENGTH(FEET) =    60.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      49.98
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.61
    HALFSTREET FLOOD WIDTH(FEET) =   23.45
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.26
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.60
  STREET FLOW TRAVEL TIME(MIN.) =   0.23   Tc(MIN.) =  11.28
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.456
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
```

```
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.404
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.47
  TOTAL AREA(ACRES) =     21.90        PEAK FLOW RATE(CFS) =      49.74

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.61   HALFSTREET FLOOD WIDTH(FEET) =  23.39
  FLOW VELOCITY(FEET/SEC.) =  4.26   DEPTH*VELOCITY(FT*FT/SEC.) =   2.59
  LONGEST FLOWPATH FROM NODE    108.00 TO NODE    105.00 =  2030.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1       49.74    11.28       5.456       21.90
  LONGEST FLOWPATH FROM NODE    108.00 TO NODE    105.00 =  2030.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1       18.13     9.89       5.941        7.70
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    105.00 =  1460.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      61.71       9.89        5.941
      2      66.39      11.28        5.456

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     66.39   Tc(MIN.) =   11.28
  TOTAL AREA(ACRES) =     29.60

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1       66.39    11.28       5.456       29.60
  LONGEST FLOWPATH FROM NODE    108.00 TO NODE    105.00 =  2030.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1        2.75     6.18       8.044        0.60
  LONGEST FLOWPATH FROM NODE    106.00 TO NODE    105.00 =   320.00 FEET.
```

```
  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      39.11       6.18        8.044
      2      68.25      11.28        5.456

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     68.25   Tc(MIN.) =   11.28
  TOTAL AREA(ACRES) =     30.20

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

+--------------------------------------------------------------------------+
| FLOW ENTERS EXISTING 18" CULVERT CROSSING EX. HANSON LANE AND DISCHARGES |
| INTO EXIST. CONCRETE DITCH ON N'LY SIDE OF HANSON LANE.                  |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    117.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1422.87  DOWNSTREAM(FEET) =  1422.36
  FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  38.62
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     68.25
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =  11.31
  LONGEST FLOWPATH FROM NODE    108.00 TO NODE    117.00 =  2090.00 FEET.

+--------------------------------------------------------------------------+
| FLOW ENTERS EXISTING CONCRETE DITCH N'LY OF HANSON LANE                  |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     30.20  TC(MIN.) =     11.31
  PEAK FLOW RATE(CFS)   =     68.25
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

POST-DEVLEOPMENT CONDITIONS

100-YEAR STORM

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            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
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              Ver. 2.0 Release Date: 01/01/2004  License ID 1503

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 ************************* DESCRIPTION OF STUDY *************************
* ESTATES AT MCDONALD, RAMONA, CA.                                       *
* POST-DEVELOPMENT CONDITIONS                                            *
* 100-YEAR STORM                                                         *
 ************************************************************************

  FILE NAME: 1061PC.DAT
  TIME/DATE OF STUDY: 12:07 04/09/2009
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   12.0      7.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  5.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
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  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    80.00
  UPSTREAM ELEVATION(FEET) =   1550.00
  DOWNSTREAM ELEVATION(FEET) =   1525.00
  ELEVATION DIFFERENCE(FEET) =     25.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.605
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.567
  SUBAREA RUNOFF(CFS) =      0.30
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.30

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1525.00  DOWNSTREAM(FEET) =   1510.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   217.00   CHANNEL SLOPE =  0.0691
  CHANNEL BASE(FEET) =    1.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.961
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.67
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.36
  AVERAGE FLOW DEPTH(FEET) =   0.11   TRAVEL TIME(MIN.) =   0.67
  Tc(MIN.) =   6.28
  SUBAREA AREA(ACRES) =     0.20       SUBAREA RUNOFF(CFS) =    0.73
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.423
  TOTAL AREA(ACRES) =      0.30         PEAK FLOW RATE(CFS) =       1.01

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.14   FLOW VELOCITY(FEET/SEC.) =   6.23
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    103.00 =   297.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1510.00  DOWNSTREAM(FEET) =   1485.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   134.00   CHANNEL SLOPE =  0.1866
  CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.519
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.70
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.83
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   0.58
  Tc(MIN.) =   6.86
  SUBAREA AREA(ACRES) =     0.40       SUBAREA RUNOFF(CFS) =    1.38
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.444
  TOTAL AREA(ACRES) =      0.70         PEAK FLOW RATE(CFS) =       2.34

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.03   FLOW VELOCITY(FEET/SEC.) =   4.36
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    104.00 =   431.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1485.00  DOWNSTREAM ELEVATION(FEET) = 1479.00
  STREET LENGTH(FEET) =   111.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 12.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   7.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.50
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.26
    HALFSTREET FLOOD WIDTH(FEET) =    6.78
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.34
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.14
  STREET FLOW TRAVEL TIME(MIN.) =   0.43   Tc(MIN.) =   7.29
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.232
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.446
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.33
  TOTAL AREA(ACRES) =      0.80        PEAK FLOW RATE(CFS) =       2.58

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   6.89
  FLOW VELOCITY(FEET/SEC.) =  4.36   DEPTH*VELOCITY(FT*FT/SEC.) =   1.15
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    105.00 =   542.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   7.29
  RAINFALL INTENSITY(INCH/HR) =   7.23
  TOTAL STREAM AREA(ACRES) =     0.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.58
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    104.10 TO NODE    104.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =   1495.00
  DOWNSTREAM ELEVATION(FEET) =   1494.40
  ELEVATION DIFFERENCE(FEET) =      0.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.923
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.347
  SUBAREA RUNOFF(CFS) =      0.29
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.29

****************************************************************************
  FLOW PROCESS FROM NODE    104.20 TO NODE    105.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1494.40  DOWNSTREAM(FEET) =   1479.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   110.00   CHANNEL SLOPE =  0.1400
  CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.024
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.71
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.44
  AVERAGE FLOW DEPTH(FEET) =   0.02   TRAVEL TIME(MIN.) =   0.75
  Tc(MIN.) =   9.68
  SUBAREA AREA(ACRES) =     0.30       SUBAREA RUNOFF(CFS) =    0.83
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.460
  TOTAL AREA(ACRES) =      0.40         PEAK FLOW RATE(CFS) =       1.11

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.03   FLOW VELOCITY(FEET/SEC.) =   2.68
  LONGEST FLOWPATH FROM NODE    104.10 TO NODE    105.00 =   170.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   9.68
  RAINFALL INTENSITY(INCH/HR) =   6.02
  TOTAL STREAM AREA(ACRES) =     0.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.11

****************************************************************************
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```
 FLOW PROCESS FROM NODE    106.00 TO NODE    107.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  84
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
 UPSTREAM ELEVATION(FEET) =   1492.00
 DOWNSTREAM ELEVATION(FEET) =   1491.40
 ELEVATION DIFFERENCE(FEET) =      0.60
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.923
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.347
 SUBAREA RUNOFF(CFS) =      0.29
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.29

****************************************************************************
 FLOW PROCESS FROM NODE    107.00 TO NODE    107.10 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1491.40  DOWNSTREAM(FEET) =   1490.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   120.00   CHANNEL SLOPE =  0.0100
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   8.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   0.50
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.706
 RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  84
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.69
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.25
 AVERAGE FLOW DEPTH(FEET) =   0.26   TRAVEL TIME(MIN.) =   1.60
 Tc(MIN.) =  10.52
 SUBAREA AREA(ACRES) =     0.30       SUBAREA RUNOFF(CFS) =    0.79
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.460
 TOTAL AREA(ACRES) =      0.40         PEAK FLOW RATE(CFS) =       1.05

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.31   FLOW VELOCITY(FEET/SEC.) =   1.38
 LONGEST FLOWPATH FROM NODE    106.00 TO NODE    107.10 =   180.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    107.10 TO NODE    105.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1490.20  DOWNSTREAM(FEET) =   1475.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   132.00   CHANNEL SLOPE =  0.1152
 CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.451
 RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  84
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.18
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  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.84
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   0.77
  Tc(MIN.) =  11.30
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.25
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.460
  TOTAL AREA(ACRES) =      0.50         PEAK FLOW RATE(CFS) =       1.25

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.03   FLOW VELOCITY(FEET/SEC.) =   3.03
  LONGEST FLOWPATH FROM NODE    106.00 TO NODE    105.00 =   312.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =  11.30
  RAINFALL INTENSITY(INCH/HR) =   5.45
  TOTAL STREAM AREA(ACRES) =     0.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.25

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1        2.58     7.29        7.232          0.80
      2        1.11     9.68        6.024          0.40
      3        1.25    11.30        5.451          0.50

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        4.23     7.29       7.232
      2        4.33     9.68       6.024
      3        4.20    11.30       5.451

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      4.33   Tc(MIN.) =    9.68
  TOTAL AREA(ACRES) =      1.70
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    105.00 =   542.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    108.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1475.00  DOWNSTREAM ELEVATION(FEET) = 1469.00
  STREET LENGTH(FEET) =    76.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 12.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   7.00
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  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.59
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    8.25
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.74
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.67
  STREET FLOW TRAVEL TIME(MIN.) =   0.22   Tc(MIN.) =   9.90
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.937
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.477
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.52
  TOTAL AREA(ACRES) =      1.80        PEAK FLOW RATE(CFS) =       5.09

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) =   8.69
  FLOW VELOCITY(FEET/SEC.) =  5.83   DEPTH*VELOCITY(FT*FT/SEC.) =   1.75
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    108.00 =   618.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   9.90
  RAINFALL INTENSITY(INCH/HR) =   5.94
  TOTAL STREAM AREA(ACRES) =     1.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.09

****************************************************************************
  FLOW PROCESS FROM NODE    109.00 TO NODE    110.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =   1475.00
  DOWNSTREAM ELEVATION(FEET) =   1474.40
  ELEVATION DIFFERENCE(FEET) =      0.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.923
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.347
  SUBAREA RUNOFF(CFS) =      0.29
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.29
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    108.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1474.40  DOWNSTREAM(FEET) =   1469.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   230.00   CHANNEL SLOPE =  0.0235
  CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.385
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.79
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.48
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   2.59
  Tc(MIN.) =  11.51
  SUBAREA AREA(ACRES) =     0.40       SUBAREA RUNOFF(CFS) =    0.99
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.460
  TOTAL AREA(ACRES) =      0.50         PEAK FLOW RATE(CFS) =       1.24

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   1.79
  LONGEST FLOWPATH FROM NODE    109.00 TO NODE    108.00 =   290.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  11.51
  RAINFALL INTENSITY(INCH/HR) =   5.39
  TOTAL STREAM AREA(ACRES) =     0.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.24

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1        5.09     9.90        5.937          1.80
      2        1.24    11.51        5.385          0.50

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        6.16     9.90       5.937
      2        5.86    11.51       5.385

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      6.16   Tc(MIN.) =    9.90
  TOTAL AREA(ACRES) =      2.30
```

```
 LONGEST FLOWPATH FROM NODE    101.00 TO NODE    108.00 =   618.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    108.00 TO NODE    111.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1467.50  DOWNSTREAM(FEET) =   1461.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    53.00   CHANNEL SLOPE =  0.1226
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   5.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.893
 URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .7100
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  94
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      6.37
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.64
 AVERAGE FLOW DEPTH(FEET) =   0.65   TRAVEL TIME(MIN.) =   0.12
 Tc(MIN.) =  10.01
 SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.42
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.483
 TOTAL AREA(ACRES) =      2.40         PEAK FLOW RATE(CFS) =       6.83

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.67   FLOW VELOCITY(FEET/SEC.) =   7.68
 LONGEST FLOWPATH FROM NODE    101.00 TO NODE    111.00 =   671.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    111.00 TO NODE    112.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1461.00  DOWNSTREAM(FEET) =  1460.20
 FLOW LENGTH(FEET) =    34.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.41
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      6.83
 PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =  10.08
 LONGEST FLOWPATH FROM NODE    101.00 TO NODE    112.00 =   705.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  10.08
 RAINFALL INTENSITY(INCH/HR) =   5.87
 TOTAL STREAM AREA(ACRES) =     2.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.83

****************************************************************************
```

```
 FLOW PROCESS FROM NODE    113.00 TO NODE    114.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  84
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
 UPSTREAM ELEVATION(FEET) =   1465.00
 DOWNSTREAM ELEVATION(FEET) =   1464.40
 ELEVATION DIFFERENCE(FEET) =      0.60
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.923
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.347
 SUBAREA RUNOFF(CFS) =      0.29
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.29

****************************************************************************
 FLOW PROCESS FROM NODE    114.00 TO NODE    112.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1464.40  DOWNSTREAM(FEET) =   1460.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   160.00   CHANNEL SLOPE =  0.0263
 CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.662
 RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  84
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.69
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.54
 AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   1.73
 Tc(MIN.) =  10.65
 SUBAREA AREA(ACRES) =     0.30       SUBAREA RUNOFF(CFS) =    0.78
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.460
 TOTAL AREA(ACRES) =      0.40         PEAK FLOW RATE(CFS) =       1.04

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   1.84
 LONGEST FLOWPATH FROM NODE    113.00 TO NODE    112.00 =   220.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  10.65
 RAINFALL INTENSITY(INCH/HR) =   5.66
 TOTAL STREAM AREA(ACRES) =     0.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.04

 ** CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY      AREA
```

```
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1        6.83    10.08        5.867          2.40
      2        1.04    10.65        5.662          0.40

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        7.82    10.08       5.867
      2        7.63    10.65       5.662

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      7.82   Tc(MIN.) =   10.08
  TOTAL AREA(ACRES) =      2.80
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    112.00 =   705.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    115.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1460.20  DOWNSTREAM(FEET) =   1454.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =    42.00   CHANNEL SLOPE =  0.1262
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   5.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      7.82
  FLOW VELOCITY(FEET/SEC.) =   8.04   FLOW DEPTH(FEET) =   0.70
  TRAVEL TIME(MIN.) =   0.09   Tc(MIN.) =  10.17
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    115.00 =   747.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    116.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1454.90  DOWNSTREAM(FEET) =  1451.63
  FLOW LENGTH(FEET) =    34.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.58
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      7.82
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =  10.21
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    116.00 =   781.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    116.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  10.21
```

```
  RAINFALL INTENSITY(INCH/HR) =   5.82
  TOTAL STREAM AREA(ACRES) =     2.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.82

****************************************************************************
  FLOW PROCESS FROM NODE    117.00 TO NODE    118.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =   1458.00
  DOWNSTREAM ELEVATION(FEET) =   1457.40
  ELEVATION DIFFERENCE(FEET) =      0.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.923
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.347
  SUBAREA RUNOFF(CFS) =      0.29
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.29

****************************************************************************
  FLOW PROCESS FROM NODE    118.00 TO NODE    116.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1457.40  DOWNSTREAM(FEET) =   1451.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =   140.00   CHANNEL SLOPE =  0.0414
  CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.780
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.69
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.68
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   1.39
  Tc(MIN.) =  10.32
  SUBAREA AREA(ACRES) =     0.30       SUBAREA RUNOFF(CFS) =    0.80
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.460
  TOTAL AREA(ACRES) =      0.40         PEAK FLOW RATE(CFS) =       1.06

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.03   FLOW VELOCITY(FEET/SEC.) =   1.98
  LONGEST FLOWPATH FROM NODE    117.00 TO NODE    116.00 =   200.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    116.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  10.32
  RAINFALL INTENSITY(INCH/HR) =   5.78
```

```
  TOTAL STREAM AREA(ACRES) =     0.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.06

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1        7.82    10.21        5.820          2.80
      2        1.06    10.32        5.780          0.40

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        8.87    10.21       5.820
      2        8.82    10.32       5.780

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      8.87   Tc(MIN.) =   10.21
  TOTAL AREA(ACRES) =      3.20
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    116.00 =   781.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    119.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1451.60  DOWNSTREAM(FEET) =   1449.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =    48.00   CHANNEL SLOPE =  0.0437
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.769
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      9.80
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.71
  AVERAGE FLOW DEPTH(FEET) =   0.93   TRAVEL TIME(MIN.) =   0.14
  Tc(MIN.) =  10.35
  SUBAREA AREA(ACRES) =     0.70       SUBAREA RUNOFF(CFS) =    1.86
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.474
  TOTAL AREA(ACRES) =      3.90         PEAK FLOW RATE(CFS) =      10.67

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.95   FLOW VELOCITY(FEET/SEC.) =   5.90
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    119.00 =   829.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    119.00 TO NODE    120.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1449.50  DOWNSTREAM(FEET) =  1446.00
  FLOW LENGTH(FEET) =    32.00   MANNING'S N =  0.013
```

```
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.64
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     10.67
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =  10.38
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    120.00 =   861.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  10.38
  RAINFALL INTENSITY(INCH/HR) =   5.76
  TOTAL STREAM AREA(ACRES) =     3.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.67

****************************************************************************
  FLOW PROCESS FROM NODE    121.00 TO NODE    122.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =   1452.00
  DOWNSTREAM ELEVATION(FEET) =   1451.50
  ELEVATION DIFFERENCE(FEET) =      0.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.146
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.731
  SUBAREA RUNOFF(CFS) =      0.31
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.31

****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    120.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1451.50  DOWNSTREAM(FEET) =   1446.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   140.00   CHANNEL SLOPE =  0.0393
  CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.110
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.73
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.77
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   1.32
  Tc(MIN.) =   9.47
  SUBAREA AREA(ACRES) =     0.30       SUBAREA RUNOFF(CFS) =    0.84
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.460
```

```
  TOTAL AREA(ACRES) =      0.40         PEAK FLOW RATE(CFS) =       1.12

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.03   FLOW VELOCITY(FEET/SEC.) =   2.10
  LONGEST FLOWPATH FROM NODE    121.00 TO NODE    120.00 =   190.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   9.47
  RAINFALL INTENSITY(INCH/HR) =   6.11
  TOTAL STREAM AREA(ACRES) =     0.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.12

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       10.67    10.38        5.758          3.90
      2        1.12     9.47        6.110          0.40

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       11.18     9.47       6.110
      2       11.73    10.38       5.758

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     11.73   Tc(MIN.) =   10.38
  TOTAL AREA(ACRES) =      4.30
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    120.00 =   861.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    123.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1446.00  DOWNSTREAM(FEET) =   1442.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =    72.00   CHANNEL SLOPE =  0.0431
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   5.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     11.73
  FLOW VELOCITY(FEET/SEC.) =   6.00   FLOW DEPTH(FEET) =   0.99
  TRAVEL TIME(MIN.) =   0.20   Tc(MIN.) =  10.58
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    123.00 =   933.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    123.00 TO NODE    123.00 IS CODE =   1
----------------------------------------------------------------------------
```

```
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  10.58
  RAINFALL INTENSITY(INCH/HR) =   5.69
  TOTAL STREAM AREA(ACRES) =     4.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.73

****************************************************************************
  FLOW PROCESS FROM NODE    124.00 TO NODE    125.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
================================================================================
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    40.00
  UPSTREAM ELEVATION(FEET) =   1446.00
  DOWNSTREAM ELEVATION(FEET) =   1445.60
  ELEVATION DIFFERENCE(FEET) =      0.40
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.286
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.233
  SUBAREA RUNOFF(CFS) =      0.33
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.33

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    123.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1445.60  DOWNSTREAM(FEET) =   1442.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   150.00   CHANNEL SLOPE =  0.0180
  CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.388
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.92
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.62
  AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =   1.55
  Tc(MIN.) =   8.83
  SUBAREA AREA(ACRES) =     0.40       SUBAREA RUNOFF(CFS) =    1.18
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.460
  TOTAL AREA(ACRES) =      0.50         PEAK FLOW RATE(CFS) =       1.47

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.05   FLOW VELOCITY(FEET/SEC.) =   1.81
  LONGEST FLOWPATH FROM NODE    124.00 TO NODE    123.00 =   190.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    123.00 TO NODE    123.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
```

```
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   8.83
  RAINFALL INTENSITY(INCH/HR) =   6.39
  TOTAL STREAM AREA(ACRES) =     0.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.47

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       11.73    10.58        5.687          4.30
      2        1.47     8.83        6.388          0.50

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       11.91     8.83       6.388
      2       13.04    10.58       5.687

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     13.04   Tc(MIN.) =   10.58
  TOTAL AREA(ACRES) =      4.80
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    123.00 =   933.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    123.00 TO NODE    126.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1442.90  DOWNSTREAM(FEET) =   1439.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =    75.00   CHANNEL SLOPE =  0.0493
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   5.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     13.04
  FLOW VELOCITY(FEET/SEC.) =   6.46   FLOW DEPTH(FEET) =   1.00
  TRAVEL TIME(MIN.) =   0.19   Tc(MIN.) =  10.77
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    126.00 =  1008.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    126.00 TO NODE    127.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1439.20  DOWNSTREAM(FEET) =  1437.80
  FLOW LENGTH(FEET) =    32.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.45
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     13.04
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =  10.81
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    127.00 =  1040.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    127.00 TO NODE    127.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  10.81
  RAINFALL INTENSITY(INCH/HR) =   5.61
  TOTAL STREAM AREA(ACRES) =     4.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     13.04

****************************************************************************
  FLOW PROCESS FROM NODE    128.00 TO NODE    129.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =   1443.00
  DOWNSTREAM ELEVATION(FEET) =   1442.50
  ELEVATION DIFFERENCE(FEET) =      0.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.146
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.731
  SUBAREA RUNOFF(CFS) =      0.31
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.31

****************************************************************************
  FLOW PROCESS FROM NODE    129.00 TO NODE    127.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1442.50  DOWNSTREAM(FEET) =   1437.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   143.00   CHANNEL SLOPE =  0.0329
  CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.048
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.87
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.62
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   1.47
  Tc(MIN.) =   9.62
  SUBAREA AREA(ACRES) =     0.40       SUBAREA RUNOFF(CFS) =    1.11
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.460
  TOTAL AREA(ACRES) =      0.50         PEAK FLOW RATE(CFS) =       1.39

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   2.11
  LONGEST FLOWPATH FROM NODE    128.00 TO NODE    127.00 =   193.00 FEET.

****************************************************************************
```

```
 FLOW PROCESS FROM NODE    127.00 TO NODE    127.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.62
 RAINFALL INTENSITY(INCH/HR) =   6.05
 TOTAL STREAM AREA(ACRES) =     0.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.39

 ** CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY      AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       13.04    10.81        5.607          4.80
     2        1.39     9.62        6.048          0.50

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       13.48     9.62       6.048
     2       14.32    10.81       5.607

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     14.32   Tc(MIN.) =   10.81
 TOTAL AREA(ACRES) =      5.30
 LONGEST FLOWPATH FROM NODE    101.00 TO NODE    127.00 =  1040.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    127.00 TO NODE    130.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1437.80  DOWNSTREAM(FEET) =  1437.00
 FLOW LENGTH(FEET) =    32.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.10
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     14.32
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =  10.87
 LONGEST FLOWPATH FROM NODE    101.00 TO NODE    130.00 =  1072.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  10.87
 RAINFALL INTENSITY(INCH/HR) =   5.59
 TOTAL STREAM AREA(ACRES) =     5.30
```

```
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     14.32

****************************************************************************
  FLOW PROCESS FROM NODE    131.00 TO NODE    132.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    40.00
  UPSTREAM ELEVATION(FEET) =   1441.00
  DOWNSTREAM ELEVATION(FEET) =   1440.60
  ELEVATION DIFFERENCE(FEET) =      0.40
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.286
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.233
  SUBAREA RUNOFF(CFS) =      0.33
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.33

****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    130.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1440.60  DOWNSTREAM(FEET) =   1437.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   150.00   CHANNEL SLOPE =  0.0187
  CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.388
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.92
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.62
  AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =   1.55
  Tc(MIN.) =   8.83
  SUBAREA AREA(ACRES) =     0.40       SUBAREA RUNOFF(CFS) =    1.18
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.460
  TOTAL AREA(ACRES) =      0.50         PEAK FLOW RATE(CFS) =       1.47

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.05   FLOW VELOCITY(FEET/SEC.) =   1.81
  LONGEST FLOWPATH FROM NODE    131.00 TO NODE    130.00 =   190.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   8.83
  RAINFALL INTENSITY(INCH/HR) =   6.39
  TOTAL STREAM AREA(ACRES) =     0.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.47
```

```
  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       14.32    10.87        5.589          5.30
      2        1.47     8.83        6.388          0.50

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       14.00     8.83       6.388
      2       15.61    10.87       5.589

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     15.61   Tc(MIN.) =   10.87
  TOTAL AREA(ACRES) =      5.80
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    130.00 =  1072.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    133.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1437.80  DOWNSTREAM(FEET) =   1431.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =    72.00   CHANNEL SLOPE =  0.0903
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   5.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     15.61
  FLOW VELOCITY(FEET/SEC.) =   8.50   FLOW DEPTH(FEET) =   0.96
  TRAVEL TIME(MIN.) =   0.14   Tc(MIN.) =  11.01
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    133.00 =  1144.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    133.00 TO NODE    134.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1431.30  DOWNSTREAM(FEET) =  1429.30
  FLOW LENGTH(FEET) =    35.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.38
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     15.61
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =  11.05
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    134.00 =  1179.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    134.00 TO NODE    134.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
```

```
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  11.05
  RAINFALL INTENSITY(INCH/HR) =   5.53
  TOTAL STREAM AREA(ACRES) =     5.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     15.61

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    136.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =   1438.00
  DOWNSTREAM ELEVATION(FEET) =   1437.50
  ELEVATION DIFFERENCE(FEET) =      0.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.146
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.731
  SUBAREA RUNOFF(CFS) =      0.31
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.31

****************************************************************************
  FLOW PROCESS FROM NODE    136.00 TO NODE    134.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1437.50  DOWNSTREAM(FEET) =   1429.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =   141.00   CHANNEL SLOPE =  0.0582
  CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.201
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.88
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.13
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   1.10
  Tc(MIN.) =   9.25
  SUBAREA AREA(ACRES) =     0.40       SUBAREA RUNOFF(CFS) =    1.14
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.460
  TOTAL AREA(ACRES) =      0.50         PEAK FLOW RATE(CFS) =       1.43

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   2.52
  LONGEST FLOWPATH FROM NODE    135.00 TO NODE    134.00 =   191.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    134.00 TO NODE    134.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
```

```
  TIME OF CONCENTRATION(MIN.) =   9.25
  RAINFALL INTENSITY(INCH/HR) =   6.20
  TOTAL STREAM AREA(ACRES) =     0.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.43

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       15.61    11.05        5.530          5.80
      2        1.43     9.25        6.201          0.50

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       15.35     9.25       6.201
      2       16.88    11.05       5.530

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     16.88   Tc(MIN.) =   11.05
  TOTAL AREA(ACRES) =      6.30
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    134.00 =  1179.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    134.00 TO NODE    137.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1429.30  DOWNSTREAM(FEET) =   1427.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =    50.00   CHANNEL SLOPE =  0.0280
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   5.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     16.88
  FLOW VELOCITY(FEET/SEC.) =   5.57   FLOW DEPTH(FEET) =   1.23
  TRAVEL TIME(MIN.) =   0.15   Tc(MIN.) =  11.20
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    137.00 =  1229.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    137.00 TO NODE    138.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1427.90  DOWNSTREAM(FEET) =  1426.70
  FLOW LENGTH(FEET) =    36.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.69
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     16.88
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =  11.25
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    138.00 =  1265.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    138.00 TO NODE    138.00 IS CODE =   1
```

```
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  11.25
  RAINFALL INTENSITY(INCH/HR) =   5.47
  TOTAL STREAM AREA(ACRES) =     6.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     16.88

****************************************************************************
  FLOW PROCESS FROM NODE    139.00 TO NODE    140.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =   1433.50
  DOWNSTREAM ELEVATION(FEET) =   1433.00
  ELEVATION DIFFERENCE(FEET) =      0.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.146
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.731
  SUBAREA RUNOFF(CFS) =      0.31
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.31

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    138.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1433.00  DOWNSTREAM(FEET) =   1426.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   125.00   CHANNEL SLOPE =  0.0504
  CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.174
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.74
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.78
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   1.17
  Tc(MIN.) =   9.31
  SUBAREA AREA(ACRES) =     0.30       SUBAREA RUNOFF(CFS) =    0.85
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.460
  TOTAL AREA(ACRES) =      0.40         PEAK FLOW RATE(CFS) =       1.14

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.03   FLOW VELOCITY(FEET/SEC.) =   2.12
  LONGEST FLOWPATH FROM NODE    139.00 TO NODE    138.00 =   175.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    138.00 TO NODE    138.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   9.31
  RAINFALL INTENSITY(INCH/HR) =   6.17
  TOTAL STREAM AREA(ACRES) =     0.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.14

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       16.88    11.25        5.466          6.30
      2        1.14     9.31        6.174          0.40

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       16.08     9.31       6.174
      2       17.89    11.25       5.466

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     17.89   Tc(MIN.) =   11.25
  TOTAL AREA(ACRES) =      6.70
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    138.00 =  1265.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    138.00 TO NODE    141.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1426.70  DOWNSTREAM(FEET) =   1425.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    56.00   CHANNEL SLOPE =  0.0304
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   5.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     17.89
  FLOW VELOCITY(FEET/SEC.) =   5.83   FLOW DEPTH(FEET) =   1.24
  TRAVEL TIME(MIN.) =   0.16   Tc(MIN.) =  11.41
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    141.00 =  1321.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    141.00 TO NODE    142.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1425.00  DOWNSTREAM(FEET) =  1424.00
  FLOW LENGTH(FEET) =    39.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.96
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     17.89
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =  11.47
```

```
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    142.00 =  1360.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    142.00 TO NODE    142.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  11.47
  RAINFALL INTENSITY(INCH/HR) =   5.40
  TOTAL STREAM AREA(ACRES) =     6.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     17.89

****************************************************************************
  FLOW PROCESS FROM NODE    143.00 TO NODE    144.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =   1432.00
  DOWNSTREAM ELEVATION(FEET) =   1431.50
  ELEVATION DIFFERENCE(FEET) =      0.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.146
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.731
  SUBAREA RUNOFF(CFS) =      0.31
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.31

****************************************************************************
  FLOW PROCESS FROM NODE    144.00 TO NODE    142.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1431.50  DOWNSTREAM(FEET) =   1424.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   120.00   CHANNEL SLOPE =  0.0625
  CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.278
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.89
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.15
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   0.93
  Tc(MIN.) =   9.08
  SUBAREA AREA(ACRES) =     0.40       SUBAREA RUNOFF(CFS) =    1.16
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.460
  TOTAL AREA(ACRES) =      0.50         PEAK FLOW RATE(CFS) =       1.44

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   2.55
  LONGEST FLOWPATH FROM NODE    143.00 TO NODE    142.00 =   170.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    142.00 TO NODE    142.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   9.08
  RAINFALL INTENSITY(INCH/HR) =   6.28
  TOTAL STREAM AREA(ACRES) =     0.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.44

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       17.89    11.47        5.398          6.70
      2        1.44     9.08        6.278          0.50

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       16.83     9.08       6.278
      2       19.13    11.47       5.398

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     19.13   Tc(MIN.) =   11.47
  TOTAL AREA(ACRES) =      7.20
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    142.00 =  1360.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    142.00 TO NODE    305.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1424.00  DOWNSTREAM(FEET) =   1422.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =    60.00   CHANNEL SLOPE =  0.0183
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.337
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     19.25
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.90
  AVERAGE FLOW DEPTH(FEET) =   1.40   TRAVEL TIME(MIN.) =   0.20
  Tc(MIN.) =  11.67
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.25
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.468
  TOTAL AREA(ACRES) =      7.30         PEAK FLOW RATE(CFS) =      19.13

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.40   FLOW VELOCITY(FEET/SEC.) =   4.89
```

```
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    305.00 =  1420.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    305.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  11.67
  RAINFALL INTENSITY(INCH/HR) =   5.34
  TOTAL STREAM AREA(ACRES) =     7.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     19.13

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    82.00
  UPSTREAM ELEVATION(FEET) =   1550.00
  DOWNSTREAM ELEVATION(FEET) =   1523.00
  ELEVATION DIFFERENCE(FEET) =     27.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.675
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.499
  SUBAREA RUNOFF(CFS) =      0.30
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.30

****************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    303.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1523.00  DOWNSTREAM(FEET) =   1503.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   134.00   CHANNEL SLOPE =  0.1493
  CHANNEL BASE(FEET) =    1.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.143
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.44
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.74
  AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   0.39
  Tc(MIN.) =   6.06
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.29
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      0.20         PEAK FLOW RATE(CFS) =       0.57

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.08   FLOW VELOCITY(FEET/SEC.) =   6.50
  LONGEST FLOWPATH FROM NODE    301.00 TO NODE    303.00 =   216.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    304.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1503.00  DOWNSTREAM(FEET) =   1427.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1012.00   CHANNEL SLOPE =  0.0742
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.401
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  82
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.51
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.74
  AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =   9.68
  Tc(MIN.) =  15.74
  SUBAREA AREA(ACRES) =     1.00       SUBAREA RUNOFF(CFS) =    1.80
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.400
  TOTAL AREA(ACRES) =      1.20         PEAK FLOW RATE(CFS) =       2.11

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   1.85
  LONGEST FLOWPATH FROM NODE    301.00 TO NODE    304.00 =  1228.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    305.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1427.90  DOWNSTREAM(FEET) =   1422.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   190.00   CHANNEL SLOPE =  0.0263
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.234
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      2.21
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.25
  AVERAGE FLOW DEPTH(FEET) =   0.58   TRAVEL TIME(MIN.) =   0.97
  Tc(MIN.) =  16.71
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.19
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.405
  TOTAL AREA(ACRES) =      1.30         PEAK FLOW RATE(CFS) =       2.23

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.58   FLOW VELOCITY(FEET/SEC.) =   3.28
  LONGEST FLOWPATH FROM NODE    301.00 TO NODE    305.00 =  1418.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    305.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  16.71
  RAINFALL INTENSITY(INCH/HR) =   4.23
  TOTAL STREAM AREA(ACRES) =     1.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.23

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       19.13    11.67        5.337          7.30
      2        2.23    16.71        4.234          1.30

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       20.69    11.67       5.337
      2       17.40    16.71       4.234

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     20.69   Tc(MIN.) =   11.67
  TOTAL AREA(ACRES) =      8.60
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    305.00 =  1420.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    306.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1422.90  DOWNSTREAM(FEET) =   1422.37
  CHANNEL LENGTH THRU SUBAREA(FEET) =    88.00   CHANNEL SLOPE =  0.0060
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.210
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     20.87
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.29
  AVERAGE FLOW DEPTH(FEET) =   1.78   TRAVEL TIME(MIN.) =   0.45
  Tc(MIN.) =  12.12
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.37
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.461
  TOTAL AREA(ACRES) =      8.70         PEAK FLOW RATE(CFS) =      20.89

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.78   FLOW VELOCITY(FEET/SEC.) =   3.29
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    306.00 =  1508.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    306.00 TO NODE    307.00 IS CODE =  51
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1422.37  DOWNSTREAM(FEET) =   1422.16
  CHANNEL LENGTH THRU SUBAREA(FEET) =    24.00   CHANNEL SLOPE =  0.0087
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.50
  CHANNEL FLOW THRU SUBAREA(CFS) =     20.89
  FLOW VELOCITY(FEET/SEC.) =   6.11   FLOW DEPTH(FEET) =   0.68
  TRAVEL TIME(MIN.) =   0.07   Tc(MIN.) =  12.18
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    307.00 =  1532.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    307.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  12.18
  RAINFALL INTENSITY(INCH/HR) =   5.19
  TOTAL STREAM AREA(ACRES) =     8.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     20.89

****************************************************************************
  FLOW PROCESS FROM NODE    308.00 TO NODE    309.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
  UPSTREAM ELEVATION(FEET) =   1427.80
  DOWNSTREAM ELEVATION(FEET) =   1426.50
  ELEVATION DIFFERENCE(FEET) =      1.30
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.841
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.899
  SUBAREA RUNOFF(CFS) =      0.32
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.32

****************************************************************************
  FLOW PROCESS FROM NODE    309.00 TO NODE    310.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1426.50  DOWNSTREAM ELEVATION(FEET) = 1424.80
  STREET LENGTH(FEET) =   215.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 12.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   7.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
```

```
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.28
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    7.82
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.75
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.50
  STREET FLOW TRAVEL TIME(MIN.) =   2.04   Tc(MIN.) =   9.89
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.941
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.460
  SUBAREA AREA(ACRES) =    0.70      SUBAREA RUNOFF(CFS) =    1.91
  TOTAL AREA(ACRES) =      0.80        PEAK FLOW RATE(CFS) =       2.19

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =   9.89
  FLOW VELOCITY(FEET/SEC.) =  1.99   DEPTH*VELOCITY(FT*FT/SEC.) =   0.65
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    310.00 =   285.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    307.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1422.64  DOWNSTREAM(FEET) =  1422.16
  FLOW LENGTH(FEET) =     8.85   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.26
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      2.19
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   9.90
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    307.00 =   293.85 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    307.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   9.90
  RAINFALL INTENSITY(INCH/HR) =   5.93
  TOTAL STREAM AREA(ACRES) =     0.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.19

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       20.89    12.18        5.192          8.70
```

```
      2        2.19     9.90        5.934          0.80

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       20.46     9.90       5.934
      2       22.80    12.18       5.192

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     22.80   Tc(MIN.) =   12.18
  TOTAL AREA(ACRES) =      9.50
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    307.00 =  1532.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    211.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1422.16  DOWNSTREAM(FEET) =   1422.14
  CHANNEL LENGTH THRU SUBAREA(FEET) =    11.70   CHANNEL SLOPE =  0.0017
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.50
  CHANNEL FLOW THRU SUBAREA(CFS) =     22.80
  FLOW VELOCITY(FEET/SEC.) =   3.64   FLOW DEPTH(FEET) =   1.25
  TRAVEL TIME(MIN.) =   0.05   Tc(MIN.) =  12.24
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    211.00 =  1543.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    211.00 TO NODE    211.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  82
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1604.00
  DOWNSTREAM ELEVATION(FEET) =   1575.00
  ELEVATION DIFFERENCE(FEET) =     29.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.765
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.412
  SUBAREA RUNOFF(CFS) =      0.34
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.34

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    203.00 IS CODE =  51
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1575.00  DOWNSTREAM(FEET) =   1467.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   880.00   CHANNEL SLOPE =  0.1225
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.175
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  82
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     10.56
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.14
  AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   3.55
  Tc(MIN.) =   9.31
  SUBAREA AREA(ACRES) =     7.90       SUBAREA RUNOFF(CFS) =   20.00
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
  TOTAL AREA(ACRES) =      8.00         PEAK FLOW RATE(CFS) =      20.25

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.18   FLOW VELOCITY(FEET/SEC.) =   5.13
  LONGEST FLOWPATH FROM NODE    201.00 TO NODE    203.00 =   980.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    204.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1467.20  DOWNSTREAM(FEET) =  1462.80
  FLOW LENGTH(FEET) =    52.30   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.70
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     20.25
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   9.36
  LONGEST FLOWPATH FROM NODE    201.00 TO NODE    204.00 =  1032.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    205.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1462.80  DOWNSTREAM(FEET) =   1445.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   535.00   CHANNEL SLOPE =  0.0333
  CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =   8.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.345
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     22.34
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.90
  AVERAGE FLOW DEPTH(FEET) =   0.33   TRAVEL TIME(MIN.) =   2.28
  Tc(MIN.) =  11.65
```

```
  SUBAREA AREA(ACRES) =     1.70       SUBAREA RUNOFF(CFS) =    4.18
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.419
  TOTAL AREA(ACRES) =      9.70         PEAK FLOW RATE(CFS) =      21.71

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.32   FLOW VELOCITY(FEET/SEC.) =   3.90
  LONGEST FLOWPATH FROM NODE    201.00 TO NODE    205.00 =  1567.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    206.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1445.00  DOWNSTREAM ELEVATION(FEET) = 1425.60
  STREET LENGTH(FEET) =   576.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 12.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   7.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      28.50
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.43
    HALFSTREET FLOOD WIDTH(FEET) =   12.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.01
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.61
  STREET FLOW TRAVEL TIME(MIN.) =   1.60   Tc(MIN.) =  13.24
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.920
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.435
  SUBAREA AREA(ACRES) =    6.00      SUBAREA RUNOFF(CFS) =   13.58
  TOTAL AREA(ACRES) =     15.70        PEAK FLOW RATE(CFS) =      33.56

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  12.00
  FLOW VELOCITY(FEET/SEC.) =  6.40   DEPTH*VELOCITY(FT*FT/SEC.) =   2.91
  LONGEST FLOWPATH FROM NODE    201.00 TO NODE    206.00 =  2143.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    206.00 TO NODE    206.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  13.24
  RAINFALL INTENSITY(INCH/HR) =   4.92
```

```
  TOTAL STREAM AREA(ACRES) =    15.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     33.56

****************************************************************************
  FLOW PROCESS FROM NODE    207.00 TO NODE    208.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  CHAPARRAL(BROADLEAF) GOOD COVER RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  78
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    80.00
  UPSTREAM ELEVATION(FEET) =   1560.00
  DOWNSTREAM ELEVATION(FEET) =   1540.00
  ELEVATION DIFFERENCE(FEET) =     20.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.605
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.567
  SUBAREA RUNOFF(CFS) =      0.30
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.30

****************************************************************************
  FLOW PROCESS FROM NODE    208.00 TO NODE    209.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1540.00  DOWNSTREAM ELEVATION(FEET) = 1427.00
  STREET LENGTH(FEET) =  1287.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 12.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   7.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.05
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =    9.79
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.56
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.11
  STREET FLOW TRAVEL TIME(MIN.) =   3.27   Tc(MIN.) =   8.88
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.369
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.458
  SUBAREA AREA(ACRES) =    4.60      SUBAREA RUNOFF(CFS) =   13.48
  TOTAL AREA(ACRES) =      4.70        PEAK FLOW RATE(CFS) =      13.70

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  12.00
```

```
  FLOW VELOCITY(FEET/SEC.) =  7.36   DEPTH*VELOCITY(FT*FT/SEC.) =   2.70
  LONGEST FLOWPATH FROM NODE    207.00 TO NODE    209.00 =  1367.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    209.00 TO NODE    206.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1427.00  DOWNSTREAM ELEVATION(FEET) = 1425.60
  STREET LENGTH(FEET) =   250.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 12.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   7.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      14.20
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.46
    HALFSTREET FLOOD WIDTH(FEET) =   12.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.65
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.22
  STREET FLOW TRAVEL TIME(MIN.) =   1.57   Tc(MIN.) =  10.45
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.733
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.474
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    1.00
  TOTAL AREA(ACRES) =      4.90        PEAK FLOW RATE(CFS) =      13.70

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  12.00
  FLOW VELOCITY(FEET/SEC.) =  2.61   DEPTH*VELOCITY(FT*FT/SEC.) =   1.19
  LONGEST FLOWPATH FROM NODE    207.00 TO NODE    206.00 =  1617.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    206.00 TO NODE    206.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  10.45
  RAINFALL INTENSITY(INCH/HR) =   5.73
  TOTAL STREAM AREA(ACRES) =     4.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     13.70

  ** CONFLUENCE DATA **
```

```
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       33.56    13.24        4.920         15.70
      2       13.70    10.45        5.733          4.90

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       40.18    10.45       5.733
      2       45.32    13.24       4.920

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     45.32   Tc(MIN.) =   13.24
  TOTAL AREA(ACRES) =     20.60
  LONGEST FLOWPATH FROM NODE    201.00 TO NODE    206.00 =  2143.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    206.00 TO NODE    210.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1425.60  DOWNSTREAM ELEVATION(FEET) = 1425.16
  STREET LENGTH(FEET) =   128.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 12.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   7.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      45.53
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.74
    HALFSTREET FLOOD WIDTH(FEET) =   23.84
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.07
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.26
  STREET FLOW TRAVEL TIME(MIN.) =   0.69   Tc(MIN.) =  13.94
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.760
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.446
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.41
  TOTAL AREA(ACRES) =     20.70        PEAK FLOW RATE(CFS) =      45.32

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.74   HALFSTREET FLOOD WIDTH(FEET) =  23.78
  FLOW VELOCITY(FEET/SEC.) =  3.07   DEPTH*VELOCITY(FT*FT/SEC.) =   2.26
```

```
  LONGEST FLOWPATH FROM NODE    201.00 TO NODE    210.00 =  2271.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    211.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1422.31  DOWNSTREAM(FEET) =   1422.14
  CHANNEL LENGTH THRU SUBAREA(FEET) =    54.70   CHANNEL SLOPE =  0.0031
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00

        ==>>WARNING: FLOW IN CHANNEL EXCEEDS CHANNEL
            CAPACITY( NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM
            ALLOWABLE DEPTH).
            AS AN APPROXIMATION, FLOWDEPTH IS SET AT MAXIMUM
            ALLOWABLE DEPTH AND IS USED FOR TRAVELTIME CALCULATIONS.

  CHANNEL FLOW THRU SUBAREA(CFS) =     45.32
  FLOW VELOCITY(FEET/SEC.) =   9.06   FLOW DEPTH(FEET) =   1.00
  TRAVEL TIME(MIN.) =   0.10   Tc(MIN.) =  14.04
  LONGEST FLOWPATH FROM NODE    201.00 TO NODE    211.00 =  2326.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    211.00 TO NODE    211.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       45.32    14.04       4.738       20.70
  LONGEST FLOWPATH FROM NODE    201.00 TO NODE    211.00 =  2326.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       22.80    12.24       5.177        9.50
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    211.00 =  1543.70 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      62.31      12.24        5.177
      2      66.19      14.04        4.738

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     66.19   Tc(MIN.) =   14.04
  TOTAL AREA(ACRES) =     30.20

****************************************************************************
  FLOW PROCESS FROM NODE    211.00 TO NODE    211.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    211.00 TO NODE    212.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1422.14  DOWNSTREAM(FEET) =   1422.01
  CHANNEL LENGTH THRU SUBAREA(FEET) =    69.00   CHANNEL SLOPE =  0.0019
  CHANNEL BASE(FEET) =    7.50   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.50

         ==>>WARNING: FLOW IN CHANNEL EXCEEDS CHANNEL
             CAPACITY( NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM
             ALLOWABLE DEPTH).
             AS AN APPROXIMATION, FLOWDEPTH IS SET AT MAXIMUM
             ALLOWABLE DEPTH AND IS USED FOR TRAVELTIME CALCULATIONS.

  CHANNEL FLOW THRU SUBAREA(CFS) =     66.19
  FLOW VELOCITY(FEET/SEC.) =   5.88   FLOW DEPTH(FEET) =   1.50
  TRAVEL TIME(MIN.) =   0.20   Tc(MIN.) =  14.23
  LONGEST FLOWPATH FROM NODE    201.00 TO NODE    212.00 =  2395.00 FEET.

+--------------------------------------------------------------------------+
| FLOW ENTERS EXISTING CONCRETE DITCH                                      |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     30.20  TC(MIN.) =     14.23
  PEAK FLOW RATE(CFS)   =     66.19
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

HYDRAULICS CALCULATIONS

EXISTING 18” RCP CROSSING HANSON LN.

Project Description

Worksheet	Circular Channel - 2
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Capacity

Input Data

Mannings Coefficient	0.013	
Channel Slope	0.84	%
Diameter	18.0	in

Results

Depth	18.0	in
Discharge	9.63	cfs
Flow Area	1.8	ft²
Wetted Perimeter	4.71	ft
Top Width	0.00	ft
Critical Depth	1.20	ft
Percent Full	100.0	%
Critical Slope	0.88	%
Velocity	5.45	ft/s
Velocity Head	0.46	ft
Specific Energy	23.5	in
Froude Number	0.00	
Maximum Discharge	**10.36**	cfs
Discharge Full	9.63	cfs
Slope Full	0.84	%
Flow Type	N/A	

Q max = 10.36 cfs

PROPOSED 1'x5.5' BOX CULVERT CAPACITY

Due to the physical constraints on the site at the intersection of the proposed Glae Jean Court and the existing Hanson Lane, the proposed 1' x 5.5' box culvert will be very flat with a maximum channel slope of 0.32%, under normal free flow conditions, the capacity of the box culvert is less than the anticipated peak flow rate of 45.3 cfs. However, the water will pond at the entrance to the culvert, inside the proposed curb inlet, to produce a headwater condition that will increase the overall capacity of the culvert.

The top of curb elevation at the curb inlet upstream of the 1' x 5.5' box culvert is at 1425.15, the flow line elevation at the gutter is 1424.65, the flow line elevation of the entrance to the box culvert is 1422.31, the maximum water depth(without overtopping the curb) is 2.84'. Based on the following headwater analysis, the capacity of the box culvert when under 2.84' of head is 46.7 cfs, greater than the anticipated 100-year peak flow rate of 45.3 cfs.

PROPOSED 1.5'x2.5' BOX CULVERT CAPACITY (before confluence point with 1'x5.5' box culvert)

Due to the physical constraints on the site at the intersection of the proposed Glae Jean Court and the existing Hanson Lane, the proposed 1.5' x 2.5' box culvert will be very flat with a maximum channel slope of 0.2%, under normal free flow conditions, the capacity of the box culvert is less than the anticipated peak flow rate of 22.8 cfs before the confluence point with the proposed 1'x5.5' box culvert from westerly of the proposed Glae Jean Court at Hanson Lane. However, the water will pond at the entrance to the culvert to produce a headwater condition that will increase the overall capacity of the culvert.

The top of curb elevation at the curb return adjacent to the entrance of the 1.5' x 2.5' box culvert is at 1425.2. The flow line elevation of the entrance to the box culvert is 1422.21. The maximum water depth(without spilling over the curb) is 2.99'. Based on the following headwater analysis, the capacity of the box culvert when under 2.99' of head is 26.2 cfs, greater than the anticipated 100-year peak flow rate of 22.8 cfs. Before the confluence point. After the confluence point, the overall peak discharge is increased to 66.2, the culvert is widened to 6.5' with the same headwater conditions. See below for more detailed analysis.

PROPOSED 1.5'x6.5' BOX CULVERT CAPACITY (after confluence point with 1'x5.5' box culvert)

Due to the physical constraints on the site at the intersection of the proposed Glae Jean Court and the existing Hanson Lane, the proposed 1.5' x 6.5' box culvert will be very flat with a maximum channel slope of 0.2%, under normal free flow conditions, the capacity of the box culvert is less than the anticipated peak flow rate of 66.2 cfs after the confluence point with the proposed 1'x5.5' box culvert from westerly of the proposed Glae Jean Court at Hanson Lane. However, the water will pond at the entrance to the culvert to produce a headwater condition that will increase the overall capacity of the culvert.

The top of curb elevation at the curb return adjacent to the entrance of the 1.5' x 6.5' box culvert is at 1425.2. The flow line elevation of the entrance to the box culvert is 1422.21. The maximum water depth(without spilling over the curb) is 2.99'. Based on the following headwater analysis, the capacity of the box culvert when under 2.99' of head is 68.2 cfs, greater than the anticipated 100-year peak flow rate of 66.2 cfs. after the confluence point.

PROPOSED 18” RCP AT EASTRLY INTERSECTOIN OF HANSON LN. AND GLAE JEAN CT. CAPACITY

Project Description		
Worksheet	PIPE 3	
Flow Element	Circular Channel	
Method	Manning's Formula	
Solve For	Full Flow Capacity	
Input Data		
Mannings Coefficient	0.013	
Channel Slope	5.54	%
Diameter	18.0	in
Results		
Depth	18.0	in
Discharge	**24.72**	**cfs**
Flow Area	1.8	ft²
Wetted Perimeter	4.71	ft
Top Width	0.00	ft
Critical Depth	1.49	ft
Percent Full	100.0	%
Critical Slope	5.11	%
Velocity	13.99	ft/s
Velocity Head	3.04	ft
Specific Energy	54.5	in
Froude Number	0.00	
Maximum Discharge	26.59	cfs
Discharge Full	24.72	cfs
Slope Full	5.54	%
Flow Type	N/A	

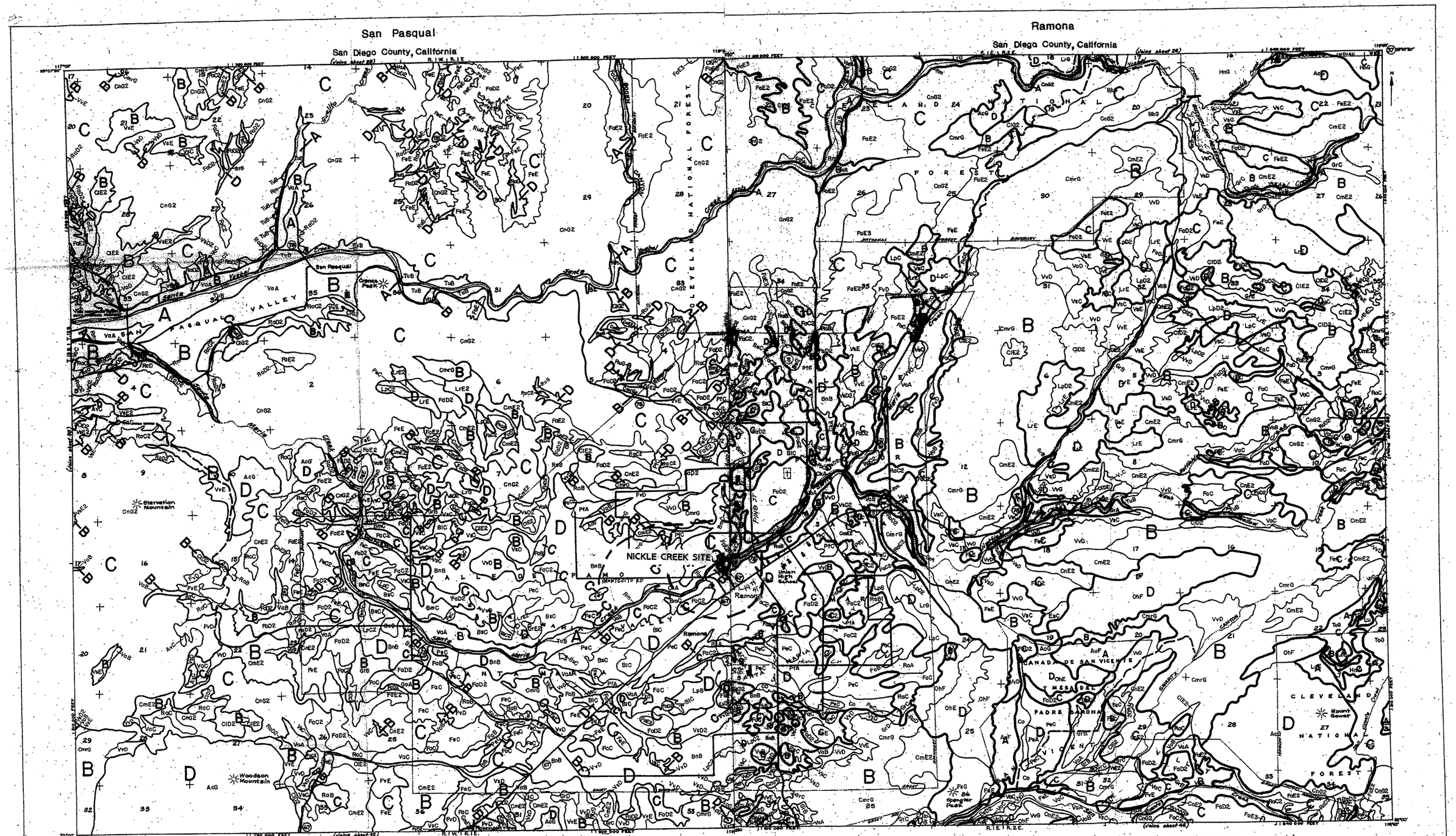
Q CAPACITY = 24.7CFS
Q MAX FROM NODE 310 – 307 = 2.2CFS, OK.

EXISTING CONCRETE DITCH ON NORTH SIDE OF HANSON LN.

Project Description		
Worksheet	EX, DITCH	
Flow Element	Circular Channel	
Method	Manning's Formula	
Solve For	Discharge	
Input Data		
Mannings Coefficient	0.013	
Channel Slope	3.30	%
Depth	9.0	in
Diameter	18.0	in
Results		
Discharge	**9.54**	**cfs**
Flow Area	0.9	ft²
Wetted Perimeter	2.36	ft
Top Width	0.00	ft
Critical Depth	1.19	ft
Percent Full	50.0	%
Critical Slope	0.87	%
Velocity	10.80	ft/s
Velocity Head	1.81	ft
Specific Energy	30.7	in
Froude Number	2.48	
Maximum Discharge	20.53	cfs
Discharge Full	19.08	cfs
Slope Full	0.83	%
Flow Type	Supercritical	

The existing concrete ditch is under capacity under both the pre and post-development conditions. However, the post development will decrease the peak flow discharged into the ditch thus it will have no additional impact to the existing down stream facilities.

APPENDIX



San Diego County Soils Interpretation Study

HYDROLOGIC SOIL GROUPS - Runoff Potential

SEE CAUTION NOTES

Group A	Group B	Group C	Group D
A Low Runoff Potential	B Moderate Runoff Potential	C High Runoff Potential	D Very High Runoff Potential

SHEET NAME: San Pasqual

San Diego County Soils Interpretation Study

HYDROLOGIC SOIL GROUPS - Runoff Potential

SEE CAUTION NOTES

Group A	Group B	Group C	Group D
A Low Runoff Potential	B Moderate Runoff Potential	C High Runoff Potential	D Very High Runoff Potential

SHEET NAME: Ramona

SHEET NUMBER: 37

Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS

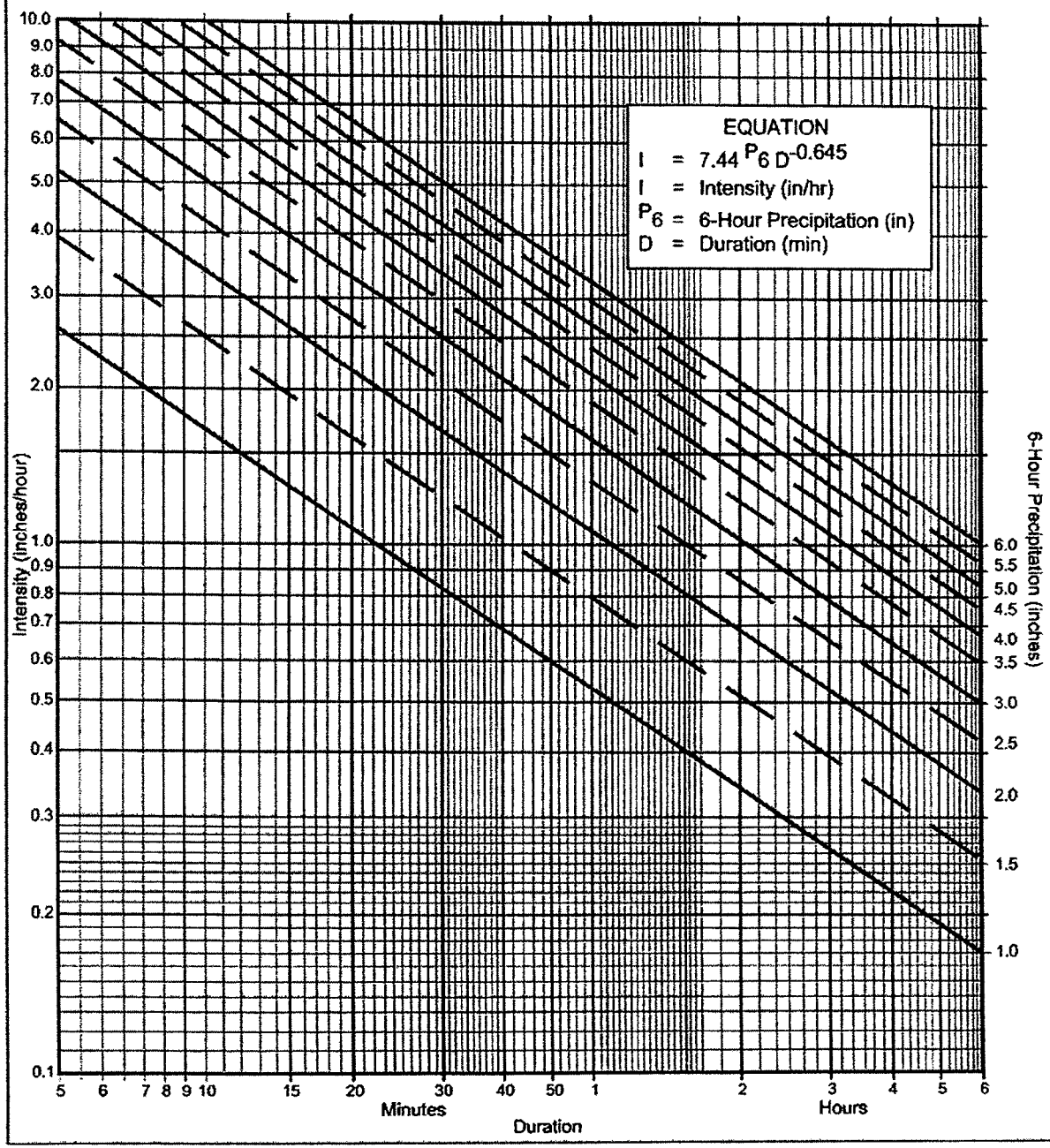
Land Use		Runoff Coefficient "C"				
			Soil Type			
NRCS Elements	County Elements	% IMPER.	A	B	C	D
Undisturbed Natural Terrain (Natural)	Permanent Open Space	0*	0.20	0.25	0.30	0.35
Low Density Residential (LDR)	Residential, 1.0 DU/A or less	10	0.27	0.32	0.36	0.41
Low Density Residential (LDR)	Residential, 2.0 DU/A or less	20	0.34	0.38	0.42	0.46
Low Density Residential (LDR)	Residential, 2.9 DU/A or less	25	0.38	0.41	0.45	0.49
Medium Density Residential (MDR)	Residential, 4.3 DU/A or less	30	0.41	0.45	0.48	0.52
Medium Density Residential (MDR)	Residential, 7.3 DU/A or less	40	0.48	0.51	0.54	0.57
Medium Density Residential (MDR)	Residential, 10.9 DU/A or less	45	0.52	0.54	0.57	0.60
Medium Density Residential (MDR)	Residential, 14.5 DU/A or less	50	0.55	0.58	0.60	0.63
High Density Residential (HDR)	Residential, 24.0 DU/A or less	65	0.66	0.67	0.69	0.71
High Density Residential (HDR)	Residential, 43.0 DU/A or less	80	0.76	0.77	0.78	0.79
Commercial/Industrial (N. Com)	Neighborhood Commercial	80	0.76	0.77	0.78	0.79
Commercial/Industrial (G. Com)	General Commercial	85	0.80	0.80	0.81	0.82
Commercial/Industrial (O.P. Com)	Office Professional/Commercial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (Limited I.)	Limited Industrial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (General I.)	General Industrial	95	0.87	0.87	0.87	0.87

POST DEV.

*The values associated with 0% impervious may be used for direct calculation of the runoff coefficient as described in Section 3.1.2 (representing the pervious runoff coefficient, Cp, for the soil type), or for areas that will remain undisturbed in perpetuity. Justification must be given that the area will remain natural forever (e.g., the area is located in Cleveland National Forest).

DU/A = dwelling units per acre

NRCS = National Resources Conservation Service



Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency 100 year

(b) P_6 = 3.5 in., P_{24} = 6.0, $\frac{P_6}{P_{24}}$ = 58 %(2)

(c) Adjusted P_6(2) = 3.5 in.

(d) t_x = _____ min.

(e) I = _____ in./hr.

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

FIGURE

3-1

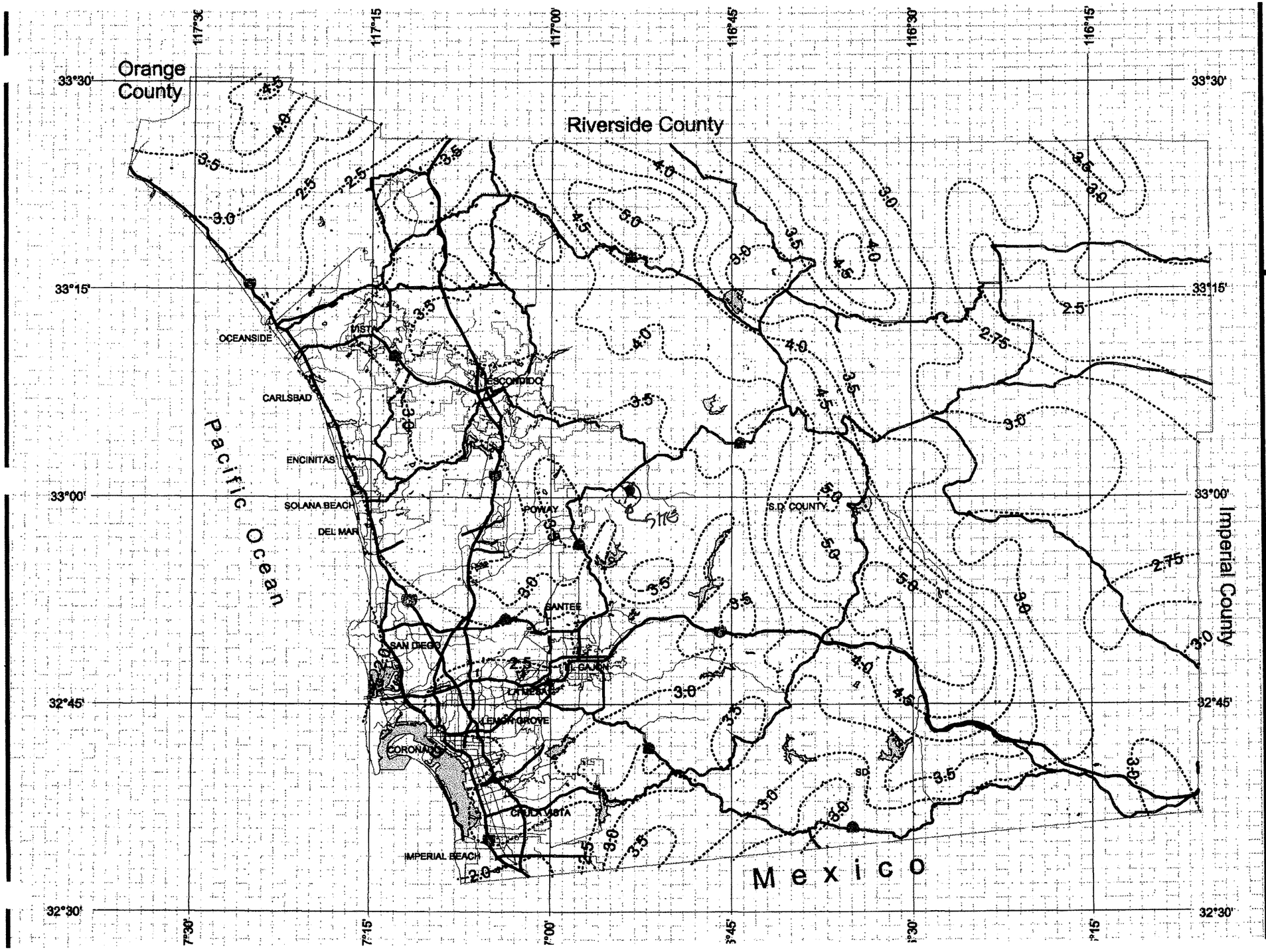
County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)

I6=3.5 IN/HR



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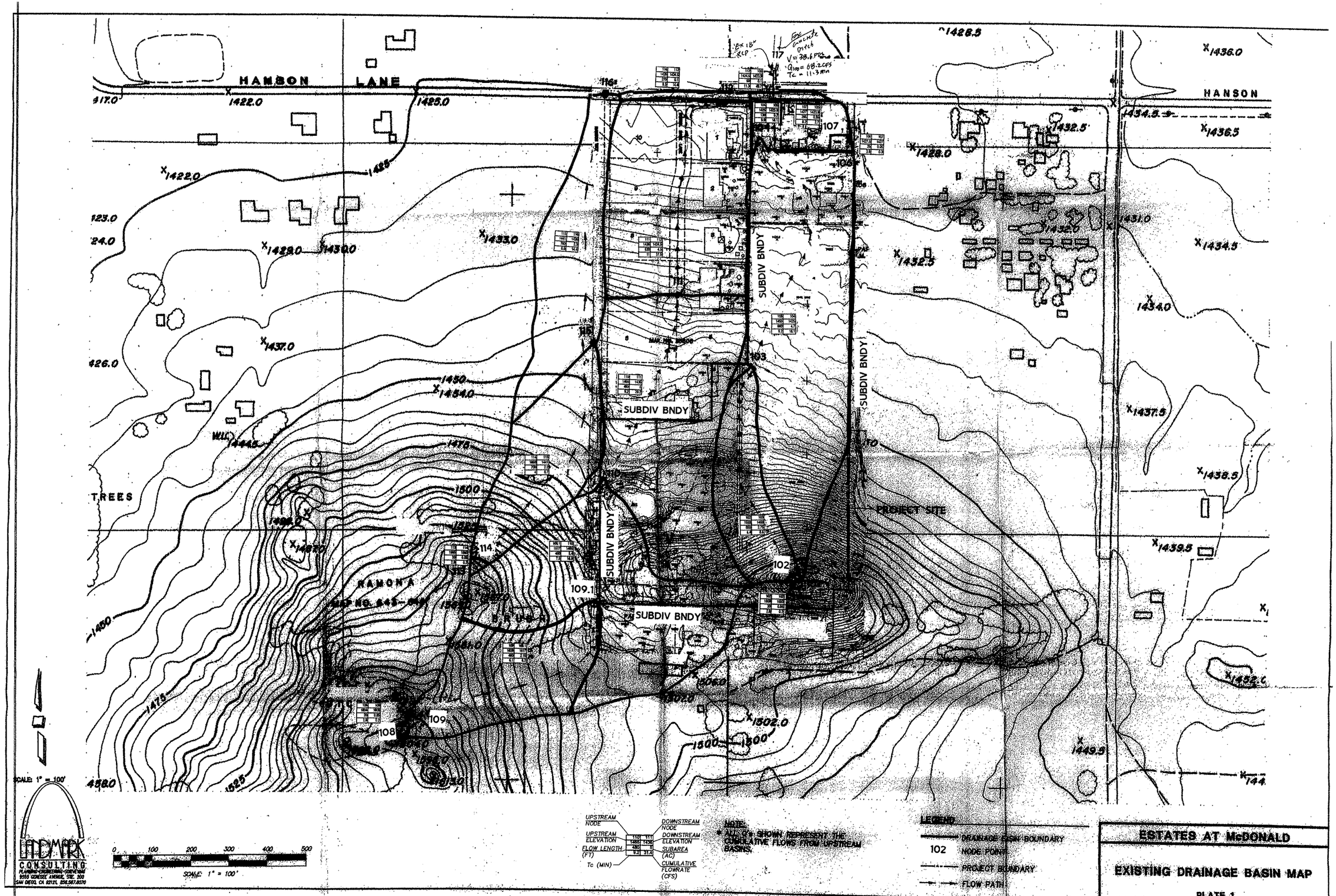
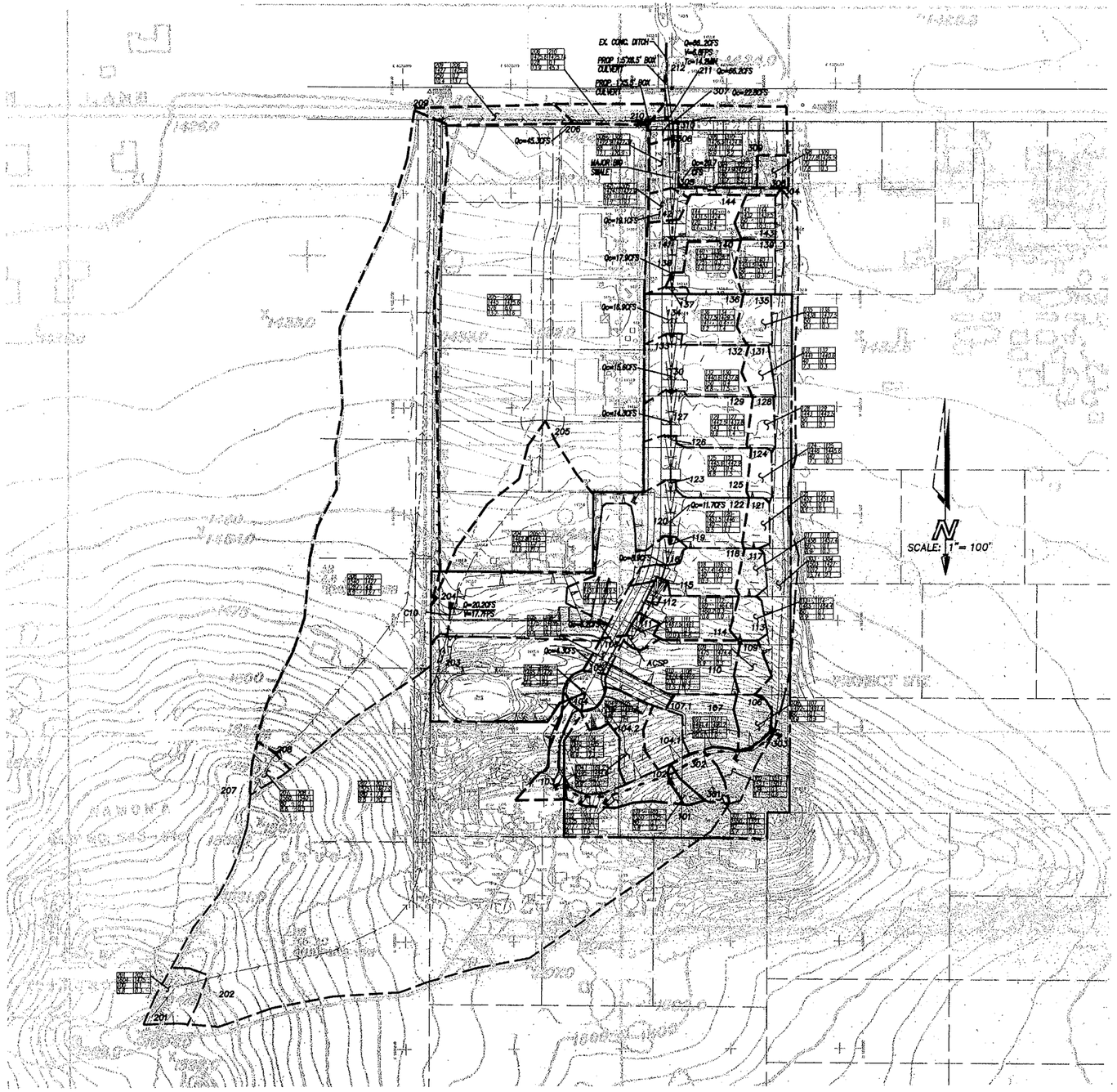
N W E S

3 0 3 Miles


HANSON LANE
HANSON
SUBDIV BNDY
PROJECT SITE
RAMONA
TREES
SCALE: 1" = 100'
0 100 200 300 400 500
SCALE: 1" = 100'
UPSTREAM NODE
UPSTREAM ELEVATION
FLOW LENGTH (FT)
Tc (MIN)
DOWNSTREAM NODE
DOWNSTREAM ELEVATION
SUBAREA (AC)
CUMULATIVE FLOWRATE (CFS)
NOTE:
* ALL Q's SHOWN REPRESENT THE CUMULATIVE FLOWS FROM UPSTREAM BASINS.
LEGEND
DRAINAGE BASIN BOUNDARY
102 NODE POINT
PROJECT BOUNDARY
FLOW PATH
ESTATES AT McDONALD
EXISTING DRAINAGE BASIN MAP
PLATE 1



LEGEND

NODE	102
TRIBUTARY AREA BOUNDARY	- - - - - -
SUB-AREA INFORMATION	UPSTREAM NODE / UPSTREAM ELEVATION / FLOW LENGTH (FT) / Tc (MIN) — DOWNSTREAM NODE / DOWNSTREAM ELEVATION / SUBAREA (AC) / CUMULATIVE FLOWRATE (CFS)
DIRECTION OF FLOW	→ - - - → - - -
SUBDIVISION BOUNDARY	———
CONFLUENCED FLOWRATE	Qc

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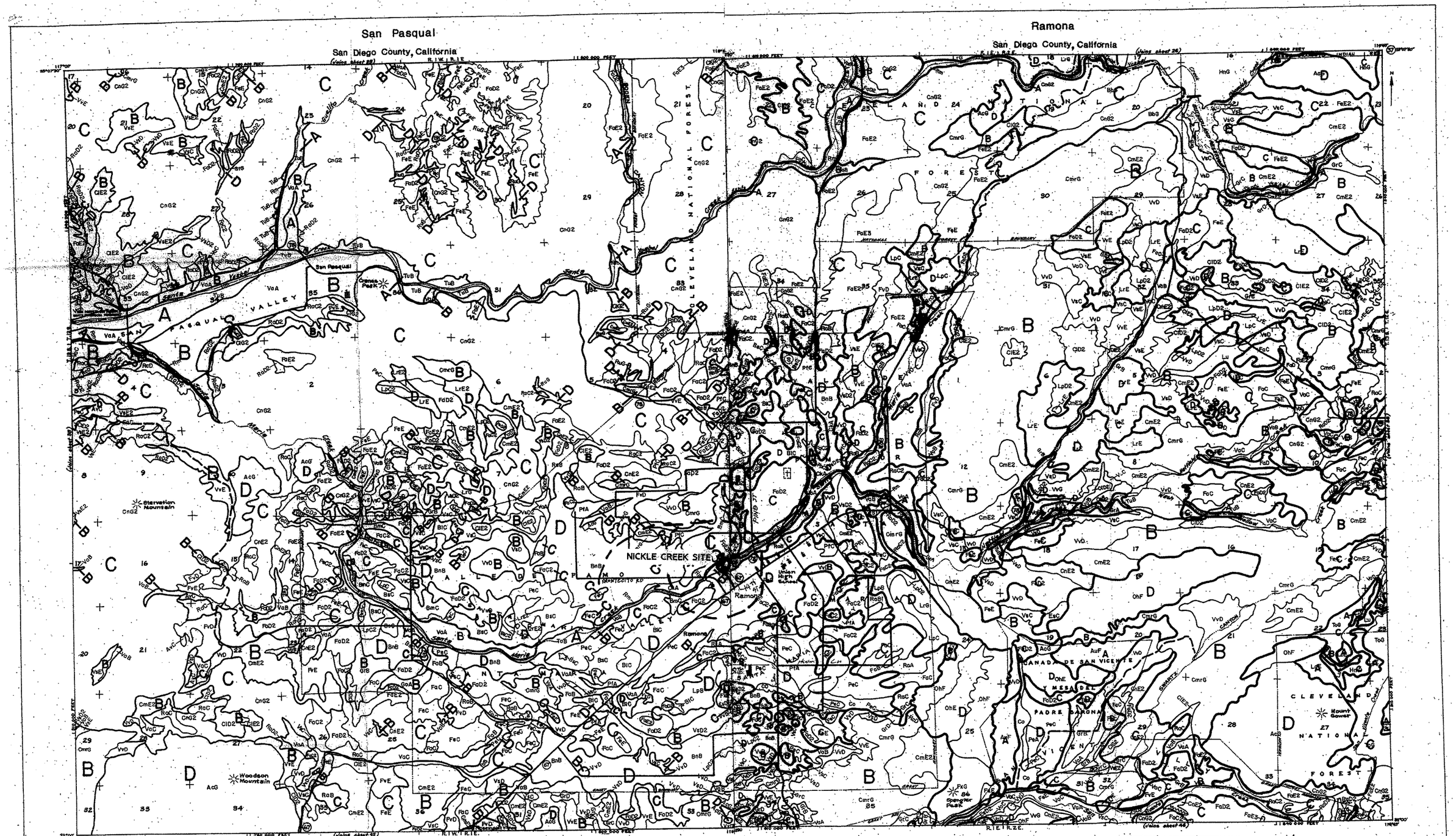
9335 GENESEE AVENUE, STE. 200
SAN DIEGO, CA 92121, 858.587.8070

0 100 200 300 400 500
SCALE: 1" = 100'

ESTATES AT McDONALD

PROPOSED DRAINAGE BASIN MAP

J.N.:



San Diego County Soils Interpretation Study

HYDROLOGIC SOIL GROUPS - Runoff Potential

SEE CAUTION NOTES

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SHEET NAME: San Pasqual

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SHEET NAME: Ramona

SHEET NUMBER: 37

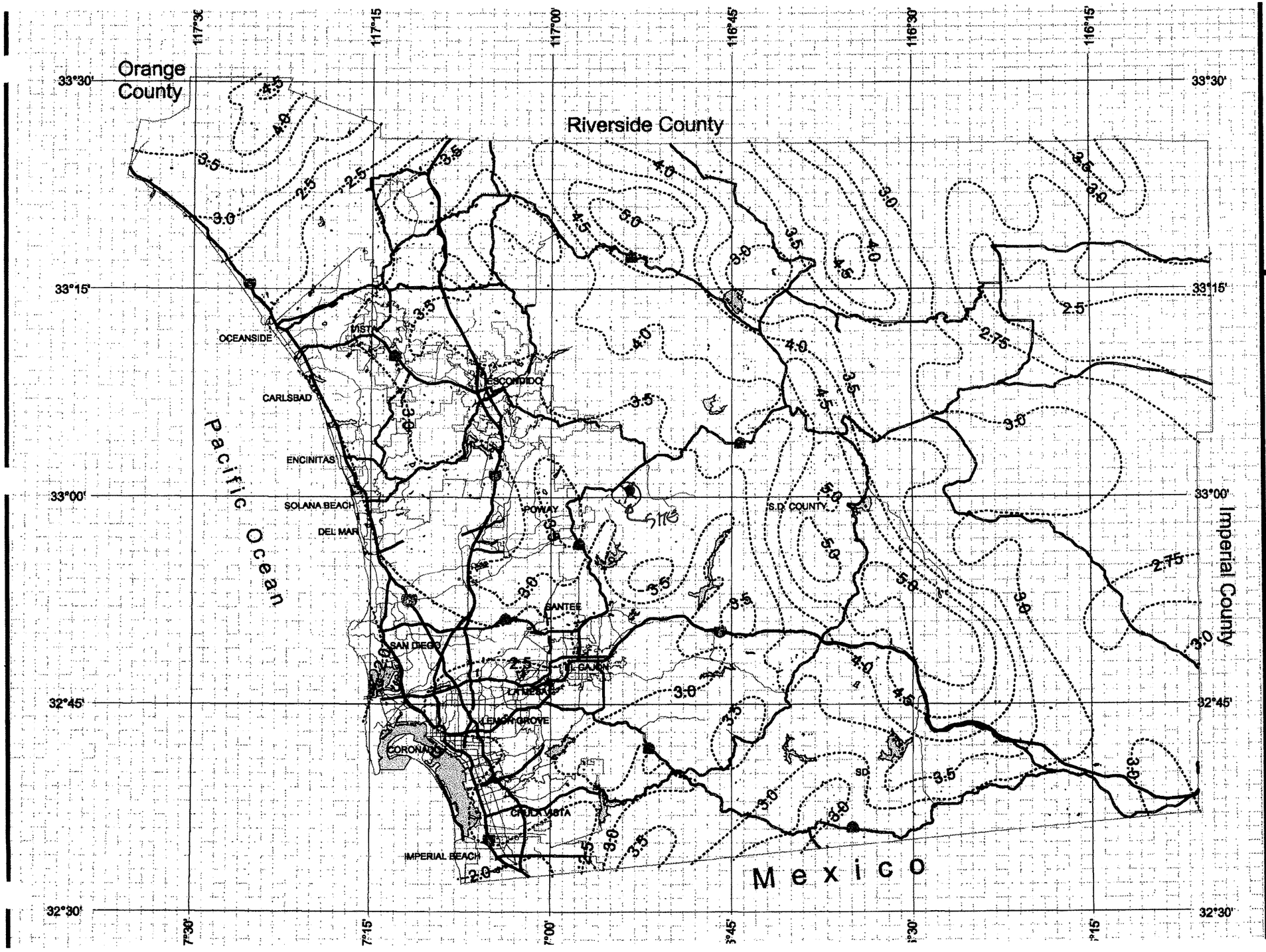
County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)

I6=3.5 IN/HR



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N W E S

3 0 3 Miles